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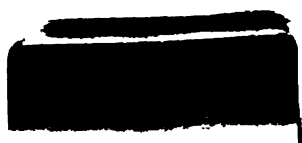
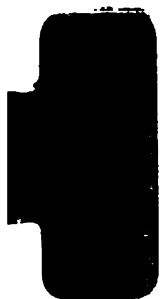
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# S U P P L E M E N T

TO THE

## ERRATA.

### VOLUME I.

Page 219, line 19,—for 1885 read 1855.  
Page 252, line 27,—to eighteen feet width on the miter-sills add, as a foot-note: The law was improperly worded; see p. 188 for correct dimensions.  
Page 259, line 22,—for Chittanooga read Limestone creek.  
Page 259, line 35,—for length read depth.  
Page 260, line 18,—for length read depth.  
Page 289, line 10,—for 1873, etc., read 1872, and its full capacity realized during the season of navigation of 1873.  
Page 359, line 27,—for Hines read Himes.  
Page 371, line 8,—for Hines read Himes.  
Page 416, line 21,—for These works read The river works.  
Page 577, last line of foot-notes,—for that name read the name of Southold.  
Page 688, line 14,—for Chemung read Chenango.  
Page 738, line 19,—for "Delaware and Susquehanna Canal Company," read "President, Managers and Company of the Delaware and Susquehanna Navigation Company."  
Page 755, line 11,—for Newton read Newtown.  
Page 761, eleventh line of table, last column,—for 1870 read 1871.  
Page 762,—combine "(Side canal)" and "Susquehanna and Chenango,"—same project.  
Page 775, line 20,—for which they proposed, etc., read which they proposed to retain, the Erie canal, and ultimately the Hudson river, water-supply would not be at all impaired by abandonment.  
Page 914, Buffalo population, 1900,—for 52,387 read 352,387.  
Page 961, line 47,—for canal read lock.

Page 966, line 43,—strike out line.  
Page 969, line 44,—strike out line.  
Page 977, line 34,—for Peterboro read Peterboro St.  
Page 982, lines 26 and 45,—for Coreville and Coleville read Coveville.  
Page 984, line 45,—for Coleville read Coveville.  
Page 986, line 6,—for Glen St. read Glen St., Glens Falls.  
Page 987, line 6,—transfer to year 1905.  
Page 988, line 6,—for guard-locks read guard-lock.  
Page 992, line 8,—for 20 read 2.  
Page 1011, line 33,—for Canadeas read Canadice.  
Page 1019, line 26,—for J. L. Whitbeck, read T. L. Witbeck.  
Page 1023, line 38,—insert 1890 at beginning of line.  
Page 1023, line 44,—for the river read improvements.

### VOLUME II.

Page 1099, second line of table, third and fourth columns,—for 29 and 30 — 3,553 + 96 read 30 and 31 — 2,684 + 53.  
Page 1292, line 2,—for 0,000 read \$500,000.  
Page 1349, line 13,—for Also incomplete form read Also in incomplete form.  
Page 1375, line 20,—for eight on one to eleven on one read one on eight to one on eleven.  
Page 1400, line 34,—for \$7,904,972 read \$4,695,204.  
Map of the Canals and Navigable Rivers of the United States and Canada, in pocket of Volume II,—the Schuylkill canal, No. 51, Pennsylvania, should be shown in orange rather than red, indicating that it is an abandoned canal.

## NOTE TO THE READER

The paper in this volume is brittle or the inner margins are extremely narrow.

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S U P P L E M E N T  
TO THE  
ANNUAL REPORT  
OF THE  
State Engineer and Surveyor  
OF THE  
STATE OF NEW YORK

For the Fiscal Year Ending September 30, 1905



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TRANSMITTED TO THE LEGISLATURE MARCH 28, 1906

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ALBANY  
BRANDOW PRINTING COMPANY  
STATE LEGISLATIVE PRINTER  
1906





HISTORY  
OF THE  
CANAL SYSTEM  
OF THE  
STATE OF NEW YORK  
TOGETHER WITH  
BRIEF HISTORIES OF THE CANALS  
OF THE  
UNITED STATES AND CANADA  
VOLUME II

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By NOBLE E. WHITFORD

*Resident Engineer, State Engineer's Department; Assoc. M. Am. Soc. C. E.*

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UNDER AUTHORITY OF HENRY A. VAN ALSTYNE,  
STATE ENGINEER AND SURVEYOR

176725



# CONTENTS.

## PART TWO—STATISTICAL AND BIOGRAPHICAL— NEW YORK CANALS.

Chapter.	Page.
I. STATISTICS—TABLES AND DIAGRAMS.	
Tables giving facts in regard to each of the State canals and other public works connected with them, including dates of authorization, commencement and completion, lengths, dimensions and costs of canals, with locks, dimensions, etc.—Diagrams giving sections of the original Erie, of the enlarged canal at the various localities, of the present and proposed canal, and of several of the lateral canals.—Dates of opening and closing of navigation on the canal, lakes and Hudson river.—Table of total movement of freight on each and all the canals from 1837 to 1905.—Tolls collected on each and all the canals during the period of toll collections.—Statement of total revenues, expenditures and costs of each and all the canals at the end of the fiscal year 1882 (approximately the end of toll collections).—Tables giving the names, locations and dimensions of all existing structures on the Erie, Champlain and Oswego canals.....	1029
II. LISTS OF MEN CONNECTED WITH CANAL ADMINISTRATION AND CONSTRUCTION.	
Canal Commissioners—Members of the Canal Board—Commissioners of the Canal Fund—Second Deputy Comptrollers, Chief Clerks and Auditors—Members of the Board of Appraisers, the Board of Claims, and the Court of Claims—Superintendents of Public Works—Deputy Superintendents of Public Works—Assistant Superintendents of Public Works—State Engineers and Surveyors—Deputy State Engineers and Surveyors—Division Engineers—Resident Engineers.....	1130
III. BIOGRAPHIES OF ENGINEERS.	
Short biographical sketches of the State Engineers to the present time, and of other engineers who have attained to the rank of Assistant Engineer, or higher, in the State service (those who have died, and of those who are living only those who attained to that rank at least twenty-five years ago).....	1145

## PART THREE—BIBLIOGRAPHY OF NEW YORK CANALS AND NAVIGABLE WATERWAYS.

A list comprising, in general, references to material in the New York State library on the canals and navigable waterways of the State, including United States documents, New York State legislative documents, the laws of New York before 1830, also those later authorizing the construction of new canals and the abandonment of the old ones, books and parts of books, articles in periodicals and some newspaper references, the aim of the list being to show briefly and clearly the resources of the New York State library on the State canals and waterways .....	1173
--	------

## PART FOUR—CANALS OF THE UNITED STATES AND CANADA.

Chapter.	Page.
<b>I. HISTORICAL SKETCHES.</b>	
<b>THE CANALS OF THE UNITED STATES.....</b>	<b>1369</b>
<ol style="list-style-type: none"> <li>1. State and Corporation canals.</li> <li>2. United States canals.</li> <li>3. United States canalized rivers.</li> </ol>	
<b>THE CANALS OF CANADA.</b>	
Including a paper on <i>this subject read before the Royal Society of Canada by Mr. Thomas C. Keefer</i> .....	
	1441
<b>II. TABULAR STATISTICS.</b>	
<b>THE CANALS OF THE UNITED STATES.....</b>	<b>1465</b>
<ol style="list-style-type: none"> <li>1. State and Corporation Canals.</li> <li>2. United States canals.</li> <li>3. United States canalized rivers.</li> </ol>	
<b>THE CANALS OF CANADA.....</b>	<b>1476</b>

## PART FIVE—GREAT CANALS OF THE WORLD.

Parts of a monograph, entitled <i>Great Canals of the World</i> , published by the United States Department of Commerce and Labor, Bureau of Statistics, reprinted here by permission of Mr. O. P. Austin, Chief of Bureau.....	
	1477
<b>INDEX (Volumes I and II).....</b>	<b>1513</b>

---

**MAP**—Canals and Navigable Rivers of the United States and Canada. . . .  
In pocket at cover.

**DIAGRAM**—Comparison of Profiles of the New York State Barge Canal and of various Railroads extending between Buffalo and New York. . . . .  
In pocket at cover.

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**PART TWO**

**STATISTICAL AND BIOGRAPHICAL**

**NEW YORK CANALS**

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## CHAPTER I.

### STATISTICS—TABLES AND DIAGRAMS.

Tables giving facts in regard to each of the State canals and other public works connected with them, including dates of authorization, commencement and completion, lengths, dimensions and costs of canals, with locks, dimensions, etc.—Diagrams giving sections of the original Erie, of the enlarged canal at the various localities, of the present and proposed canal, and of several of the lateral canals.—Dates of opening and closing of navigation on the canal, lakes and Hudson river.—Table of total movement of freight on each and all the canals from 1837 to 1905.—Tolls collected on each and all the canals during the period of toll collections.—Statement of total revenues, expenditures and costs of each and all the canals at the end of the fiscal year 1882 (approximately the end of toll collections).—Tables giving the names, locations and dimensions of all existing structures on the Erie, Champlain and Oswego canals.

Tables similar to those appearing in the first part of this chapter and giving important dates, costs and dimensions of canals, have often been published, but a comparison of the many tables presented at various times and by the several officials or authors reveals such a wide difference of statement that the attempt has been made to present here revised tables—compiled from original sources, so far as possible. However, the result is far from satisfactory, since it is almost impossible to choose from among so many varying records. Especially is this true concerning the estimates and costs of construction, the sizes of prism, the lengths and the total lockages. It is easy to see how these discrepancies have arisen. Differences of opinion in regard to the items to constitute the total cost and the period of time to be included, may account for many seeming errors. The early canals were usually built without walled sides and the shape of the prism soon became changed from its original form. Before they had completed a third of the Erie canal, the commissioners learned that a flatter slope of bank was needed, so that probably the dimensions generally given for that channel are not correct for the greater portion of its length. When the lateral canals were constructed, flatter slopes were adopted, but the varying statements concerning them are hard to reconcile. It is to be expected that the lengths, as measured at various times, would differ; the possible location of the line of measurement at the many curves may account for this, even if all of the numerous chances for error are disregarded.



Doubtless, also, errors have gradually crept into the reports and have been copied from year to year. Probably most of the items could be definitely determined, if an exhaustive research were made, but the importance of the subject does not warrant so careful a study.

Differences were found also when the diagrams here presented were prepared, and the most probable records were selected. The tables giving the dates of opening and closing of navigation and the total movement of freight, have been copied directly from the current annual report of the Superintendent of Public Works. The table of tolls collected has been compiled from the yearly reports of the various officials having charge of their collection. Similar tables were presented year after year in the Auditor's annual reports, but an attempt to verify the figures in the report for 1876 led to the discovery of so many errors that a new compilation was made. In the Auditor's reports after 1876, however, many of these errors were corrected. Even here differences of opinion as to the items included have afforded a chance for error, for the total does not agree exactly with the amount recorded in the Comptroller's recent reports (a summary only being given by him). The table of revenues, expenditures and costs to 1882 is copied from the Auditor's report for that year, and is reprinted here, so that an idea may be obtained of the financial status of the canals at the time when the collection of tolls was suspended. The tables of existing structures on the Erie, Champlain and Oswego canals were compiled especially for this volume. The survey of 1896 was used as a basis, being supplemented by all other available records and by many measurements at the structures, taken for this particular compilation.

#### ERIE CANAL.

	Original canal.	First enlargement.
Construction authorized.....	April 15, 1817	May 11, 1835
Construction commenced.....	July 4, 1817	August 1836
Construction completed.....	October 26, 1825	September 1, 1862
Engineer's estimate of cost.....	\$4,881,738	\$23,402,863.02*
Actual cost of construction.....	\$7,143,789.86	\$31,834,041.30†
Length.....	363 miles	350½ miles‡
Size of prism.....	40 and 28 x 4 feet	70 and 52½ or 56 x 7 feet
Number of lift-locks.....	83 (†)	72‡
Number of guard-locks.....	13	3
Size of locks.....	90 x 15 feet	110 x 18 feet
Total lockage.....	675½ feet (†)	654.8 feet ‡
Material in locks.....	689 feet (†)	Stone
Tonnage of boats.....	Stone 75	210 to 240

\* Estimate of 1839. † Two sets of figures given in early records.

‡ See table of existing canal structures for details of locks at present.

§ Dimensions are: widths at water-surface and bottom, by depth of water.

|| Latest survey increases length nearly a mile.

¶ As given in report of 1862; later reports give \$32,008,851 and \$36,495,535.

NOTE.—The second enlargement (never completed) called for 9 feet of water in the prism.

## CHAMPLAIN CANAL AND GLENS FALLS FEEDER.

	Canal.	Feeder.
Construction authorized.....	April 15, 1817	April 17, 1822
Construction commenced.....	1817	1822
Construction completed.....	September 10, 1823	1823
Engineer's estimate of cost.....	\$871,000	.....
Actual cost of construction.....	\$921,011.13†	\$91,944‡
Length.....	66 miles.	12 miles
Size of prism, original.....	40 and 26 x 4 feet	40 and 26 x 4 feet
Size of prism, authorized 1860.....	50 and 35 x 5 feet	50 and 35 x 5 feet
Size of prism, authorized 1870*.....	58 and 44 x 7 feet	58 and 44 x 7 feet
Number of locks, original.....	19	13
Number of lift-locks, present.....	4	1
Number of guard-locks, present.....	.....	.....
Size of locks, original.....	90 x 15 feet	90 x 15 feet
Size of locks, first enlargement.....	100 x 15 feet	.....
Size of locks, second enlargement.....	110 x 18 feet	.....
Present size of feeder locks.....	.....	12 locks, 100 x 15 feet 1 lock, 110 x 18 feet
Total lockage.....	179.5 feet‡	132 feet
Material in locks.....	Stone†	Original, wood Present, stone
Tonnage of boats, original.....	75	75
Tonnage of boats, present.....	150 to 190	140

\* Never completed.

† A few locks originally built of wood.

‡ Cost to 1832.

§ Cost to 1837.

|| See table of existing canal structures for details of locks at present.

There were 19 lift-locks and 4 guard-locks in the original canal; after the independent line was built between Saratoga falls and Fort Edward there were 18 lift-locks and 4 guard-locks in the main line; the change of location during the Erie enlargement added 2 lift-locks to the Champlain canal, but under a law of 1871 the number of lift-locks was reduced to 19 by a change at Waterford; the number of feeder locks has always remained the same; there was also a guard-lock at the head of the old Fort Edward feeder.

NOTE:—The enlargement of 1896-8 (never completed) called for 7 feet of water in the prism.

## OSWEGO CANAL.

	Original canal.	First enlargement.
Construction authorized.....	April 20, 1825	May 12, 1847* July 10, 1851†
Construction commenced.....	1825	1852
Construction completed.....	December 10, 1828	September 1, 1862
Engineer's estimate of cost.....	\$227,568.33	\$1,926,339
Actual cost of construction.....	\$565,437.35	\$2,511,992.22
Length.....	38 miles	38 miles
Size of prism.....	40 and 26 x 4 feet	70 and 52½ x 7 feet
Number of lift-locks.....	18	18‡
Number of guard-locks.....	6	5
Size of locks.....	} Lift, 90 x 15 feet } Guard, 90 x 17 feet	Lift, 110 x 18 feet Guard, 111½ x 21 feet
Total lockage.....	154.85 feet	154.85 feet§
Material in locks.....	Stone†	Stone
Tonnage of boats.....	50 to 75	210 to 240

\* Enlargement of locks only.

† Enlargement of canal prism.

‡ 23 of stone, 1 of wood.

§ Including No. 4 (now abandoned), in the north side-cut at Salina.

|| See table of existing canal structures for details of locks at present.

|| Lock No. 4 was composite when enlarged; subsequently rebuilt of stone.

NOTE:—The second enlargement (never completed) called for 9 feet of water in the prism.

## CAYUGA AND SENECA CANAL AND CAYUGA INLET.

	Private company's canal.	Cayuga inlet.
Private company incorporated.....	April 6, 1813	.....
Construction authorized.....	.....	May 2, 1835
Construction commenced.....	.....	1836
Construction completed.....	1821	1838
Engineer's estimate of cost.....	.....	None
Actual cost of construction.....	About \$70,000	\$9,836.24
Length.....	*	2.05 miles
Size of prism.....	.....	80 x 5½ feet†
Number of lift-locks.....	.....	None
Size of locks.....	70 x 12 feet	.....

	Original State canal, including branch to Cayuga lake.	Enlargement, including branch to Cayuga lake.
Construction authorized.....	Canal, April 20, 1825 Branch, Mar. 25, 1828	Locks, May 25, 1836   and November 10, 1847 Prism, Feb. 15, 1854¶
Construction commenced.....	1826	1854
Construction completed.....	November 15, 1828‡	September 1, 1862
Engineer's estimate of cost.....	Canal, \$150,000 Branch, \$10,000	\$811,188.16(a)
Actual cost of construction.....	Canal, \$214,000(b) Branch, \$18,000(b)	\$1,133,149.26(c)
Length.....	22.99 miles	22.99 miles
Size of prism.....	40 and 28 x 4 feet	70 and 52½ x 7 feet
Number of lift-locks.....	12	11
Number of guard-locks.....	None(d)	1‡
Size of locks.....	90 x 15 feet	110 x 18 feet
Total lockage.....	83.5 feet	86.58 feet
Material in locks.....	Wood	Composite(e)
Tonnage of boats.....	70 to 76	210 to 240

\* Improvements under private company consisted chiefly in locks around the falls, no towing-path being built along the river.

† Deepened to 7 feet in 1866, and towing-path built in 1869.

‡ Navigation opened.

|| Nothing done under laws of 1836.

§ Built, 1900-3, of stone.

¶ Constitutional amendment ratified by the people.

(a) As given in the State Engineer's report for 1861, p. 70; the amount given in the text of the history—\$539,482.96—is found in the State Engineer's report for 1854, p. 92—this is exclusive of lock enlargement, which had been in progress for several years before enlargement of prism was begun,—it is partly made up of contract prices of contracts which had been let in 1854.

(b) Amounts appropriated.

(c) As given in report of 1862—probably includes original cost of branch; later reports give \$1,306,542.

(d) There was a guard-gate at Seneca Falls.

(e) Locks Nos. 1, 4, 5, 6, 7 and 11 are still composite; Nos. 2, 3, 8, 9 and 10 have been rebuilt of rubble masonry.

## CHEMUNG CANAL AND FEEDER.

	Canal.	Feeder.
Construction authorized.....	April 15, 1829	April 15, 1829
Construction commenced.....	Spring, 1830	Spring, 1830
Construction completed and canal formally opened.....	May, 1833	May, 1833
Navigation opened*.....	October, 1833	October, 1833
Engineer's estimate of cost.....	\$331,125.20	Included in canal item
Actual cost of construction.....	\$314,395.51	Included in canal item
Length.....	23 miles	16 miles
Size of prism†.....	42 and 26 x 4 feet‡	41 and 26 x 4 feet
Number of lift-locks.....	49	3
Number of guard-locks.....	None	1
Size of locks.....	90 x 15 feet	90 x 15 feet
Total lockage.....	516 feet¶	Included in canal item
Material in locks.....	Wood‡	Wood
Tonnage of boats.....	85 to 90	85 to 90
Canal abandoned.....	Close of navigation, 1878	Close of navigation, 1878

\* After formal opening a severe flood so damaged canal as to delay actual opening for navigation.

† Depth increased to 4½ feet in 1863.

‡ Rebuilt twice; first with crib design; second, cribs reinforced with piles; two locks rebuilt on composite plan.

§ Given also as 42 and 28 x 5 feet.

¶ Given also as 518.08 feet.

## CROOKED LAKE CANAL.

Construction authorized.....	April 11, 1829
Construction commenced.....	April, 1831
Construction completed.....	October 10, 1833
Engineer's estimate of cost.....	\$119,198
Actual cost of construction.....	\$156,776.90
Length.....	8 miles
Size of prism.....	42 and 26 x 4 feet
Number of lift-locks.....	27
Number of guard-locks.....	1
Size of locks.....	90 x 15 feet
Total lockage.....	277.83 feet
Material in locks.....	*
Tonnage of boats.....	70 to 76
Canal abandoned.....	June 4, 1877†

\* Made originally of wood; rebuilt of cement masonry at heads, and dry walls with timber and plank facings in chambers; when abandoned, locks were: 1 stone lift-lock, 1 guard-lock and 10 lift-locks of stone with timber fenders in chambers, and 16 composite lift-locks.

† Not in operation after 1875.

## ONEIDA LAKE CANAL.

	Old Oneida Lake canal and Oneida creek feeder.	New Oneida Lake canal.
Private company incorporated.....	March 22, 1832	May 16, 1867
Construction authorized.....	.....	December, 1867
Construction commenced.....	September 12, 1835	September, 1877
Construction completed.....	.....	\$306,000†
Engineer's estimate of cost.....	.....	\$444,155.64
Actual cost of construction.....	\$78,824.85	.....
Purchase authorized by State for \$50,000	May 11, 1840	.....
State assumed control.....	April 12, 1841	.....
Length.....	{ Canal, 6½ miles    } Feeder, 3 miles } Canal, 40 and 26 x 4 } feet } Feeder, 12 feet bot- } tom width¶ } 7 (a)	5.3 miles
Size of prism.....	.....	70 and 47½ x 7 feet‡
Number of lift-locks.....	.....	6
Size of locks.....	90 x 15 feet	110 x 18 feet
Total lockage.....	57.67 feet	62 feet
Material in locks.....	Wood	Stone, timber fenders
Tonnage of boats.....	70 to 76	220
Canal abandoned.....	*	May 23, 1887†

\* Old canal not used after 1862, except first level, which is still open.

† New canal not opened after 1878; officially abandoned in 1887.

‡ As completed, 7 feet of water on first level and 5 feet on other levels; slope of tow-path side, 1 on 1½; of berme side, 1 on 2.

|| 4½ miles of canal, 2 miles of navigation on Wood creek; later 4 miles of navigation on Fish creek were opened.

¶ Made navigable for boats of three feet draught in 1847.

‡ Several other estimates were made; see text of history for details.

(a) According to the early reports there was also one wooden guard-lock.

## CHENANGO CANAL AND CHENANGO CANAL EXTENSION.

	Canal.	Extension.
Construction authorized.....	February 23, 1833	April 9, 1863
Construction commenced.....	Spring, 1834	1865
Construction completed.....	October, 1836	Never completed
Engineer's estimate of cost.....	\$1,960,456.28	\$1,524,206
Actual cost of construction.....	\$2,316,186.29	\$1,600,889.19
Length.....	97 miles	40.025 miles
Size of prism.....	42 and 26 x 4 feet†	42 and 26 x 4 feet
Number of lift-locks.....	116	10
Number of guard-locks.....	1	2
Size of locks.....	90 x 15 feet	91 x 17 feet
Total lockage.....	1,015½ feet	83 feet
Material in locks.....	*	Stone, timber fenders
Tonnage of boats.....	70 to 76	.....
Canal abandoned.....	May 1, 1878	May 1, 1878

\* Originally, 114 composite, 2 stone; rebuilt, rubble masonry in cement with timber fenders.

† Given also as 40 and 28 x 4 feet and as 40 and 24 x 4 feet.

## BLACK RIVER CANAL AND FEEDER, AND BLACK RIVER IMPROVEMENT.

	Canal.	Feeder.	River Improvement.
Construction authorized.....	April 19, 1836	April 19, 1836	April 19, 1836
Construction commenced.....	January, 1838	1838	1854*
Construction completed.....	November 13, 1855	October, 1848	1861
Engineer's estimate of cost.....	\$2,069,562.34	\$253,437.52	\$108,699.43
Actual cost of construction.....	\$3,157,296.38	Included in canal	Included in canal
Length.....	35½ miles	10 miles	42½ miles
Size of prism.....	42 and 26 x 4 feet	46 and 30 x 4 feet	60 and 40 x 5 feet
Number of lift-locks.....	109	None	2
Number of guard-locks.....	None	1†	None
Size of locks.....	90 x 15 feet	90 x 15 feet	160 x 30 feet
Total lockage.....	1,082.25 feet	†	9.25 feet
Material in locks.....	Stone	Stone	Wood
Tonnage of boats.....	70 to 76	70 to 76	.....

\* In 1838 and in 1849 partial improvements had been commenced.

† There is also a lock, serving as guard and lift-lock, at head of Delta feeder.

‡ Feeder has a grade of seven inches per mile.

## GENESEE VALLEY CANAL, EXTENSION TO MILLGROVE AND DANSVILLE BRANCH.

	Canal and Branch.	Extension.
Construction authorised.....	May 6, 1836	April 3, 1857
Construction commenced.....	1837	June, 1858
Construction completed.....	{ To Mount Morris, Au- gust, 1840 To Dansville, Nov., 1841 To Olean, 1857 }	December, 1861
Engineer's estimate of cost.....	\$2,002,285.92	\$109,105
Actual cost of construction.....	\$5,663,183.99	Included in canal item
Length.....	124½ miles	Included in canal item
Size of prism.....	42 and 26 x 4 feet	42 and 26 x 4 feet
Number of lift-locks.....	112*	None
Number of guard-locks.....	2	1
Size of locks.....	90 x 15 feet	90 x 15 feet
Total lockage.....	1,127.99 feet†	Included in canal item
Material in locks.....	Stone, wood and composite	Included in canal item
Tonnage of boats.....	70 to 76	70 to 76
Canal abandoned.....	September 30, 1878	September 30, 1878

\* 104 locks in canal, 8 in branch; 28 locks of stone, 73 composite, 11 of wood.

† Lockage of canal and extension, 1,045.39 feet; branch 82.5 feet.

## BALDWINSVILLE CANAL AND SENECA RIVER TOWING-PATH.

	Baldwinsville. canal.	Seneca River towing-path.
Construction authorized.....	.....	May 12, 1836
Construction commenced.....	1808	April 18, 1838
Construction completed.....	{ 1808 } { 1831 }	July, 1838
Collection of tolls authorized.....	February 24, 1809	October, 1839
Engineer's estimate of cost.....	.....	.....
Actual cost of construction.....	.....	\$14,804.26
State assumed control.....	1850	.....
Length.....	0.6 mile†	5.36 miles‡
Size of prism.....	40 and 24 x 4 feet	.....
Number of lift-locks.....	1	None
Number of guard-locks.....	1*	None
Size of locks, old.....	90 x 15 feet	.....
Size of lock, present.....	110 x 18 feet	.....
Total lockage.....	10 feet	.....
Material in locks.....	Wood	.....
Tonnage of boats.....	70 to 76	70 to 76

\* Changed to guard-gate in 1866.

† As completed under direction of canal board, with one lift-lock and one guard-lock of enlarged size.

‡ Lengthened in 1871 to 5.83 miles.

§ Navigation for 11½ miles above dam authorized in 1850 and abandoned in 1888.

|| Because of limited appropriation, construction was really under act of 1838.

¶ As completed before legislative authority was given, probably with one lock, 77½ x 12 feet.

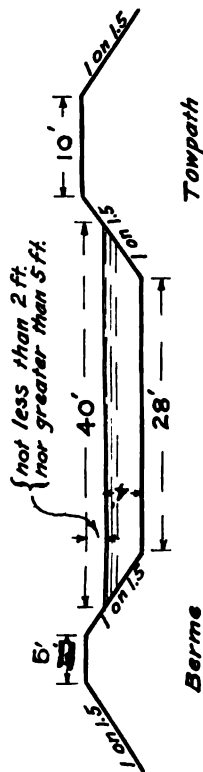
## ONEIDA RIVER IMPROVEMENT.

Construction authorized.....	April 29, 1839
Construction commenced.....	1839
Construction completed.....	1850
Engineer's estimate of cost.....	\$100,049.99
Actual cost of construction.....	\$79,346.44
Length.....	19½ miles
Size of channel.....	80 and 60 x 4½ feet
Number of lift-locks.....	2
Number of guard-locks.....	None
Size of locks.....	120 x 30½ feet
Total lockage.....	6½ feet
Material in locks.....	Stone
Tonnage of boats.....	.....



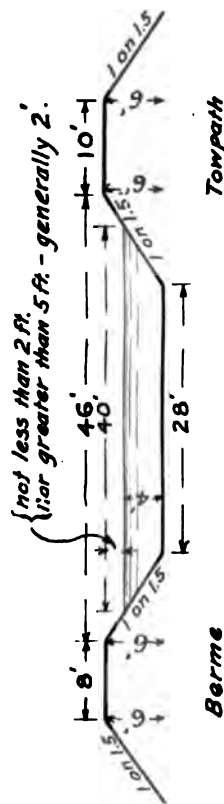
1817

Section of Original Erie in fill or cut of less than 9 ft.  
according to original specifications.



1817

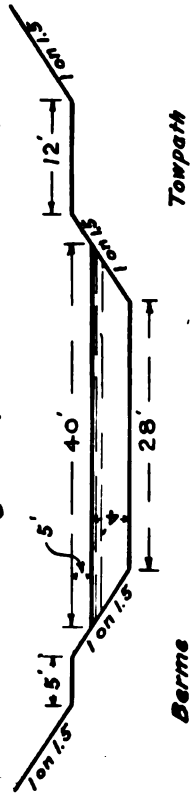
Section of Original Erie as built.  
Note 8 ft. berme instead of 5 ft. as specified.



Scale 1 in. = 20 ft.

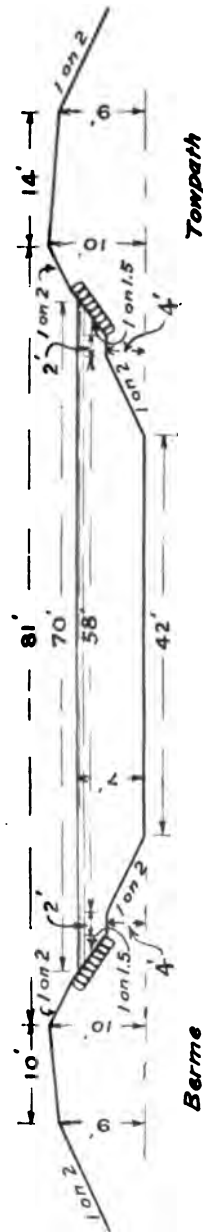
1817

Section of Original Erie in cut greater than 9 ft.  
according to specifications.



1836

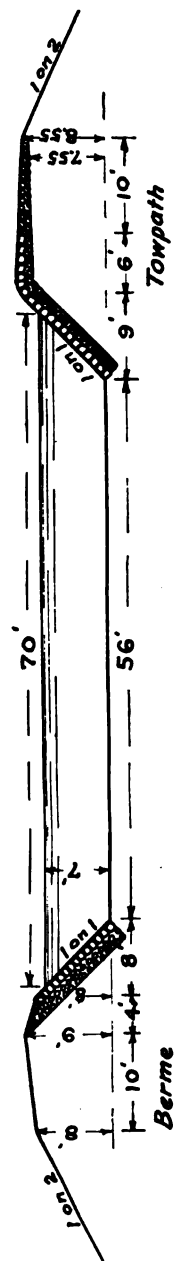
Section of Enlarged Erie according to original plans.



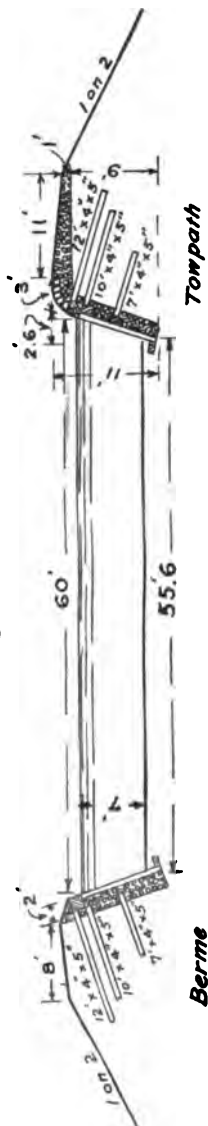
Note — Portions enlarged prior to 1848 were  
according to this plan; later enlargements  
according to following plans.

Scale 1 in. = 20 ft.

1848  
Section of Enlarged Erie according to improved plans — Eastern Division.



Section of Erie where sidedocking was used — Eastern Division.  
as enlarged in 1862.



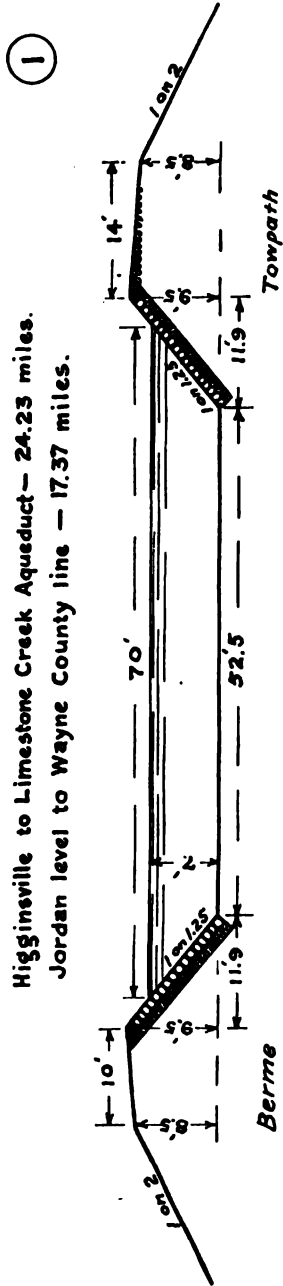
Scale 1 in. = 20 ft.



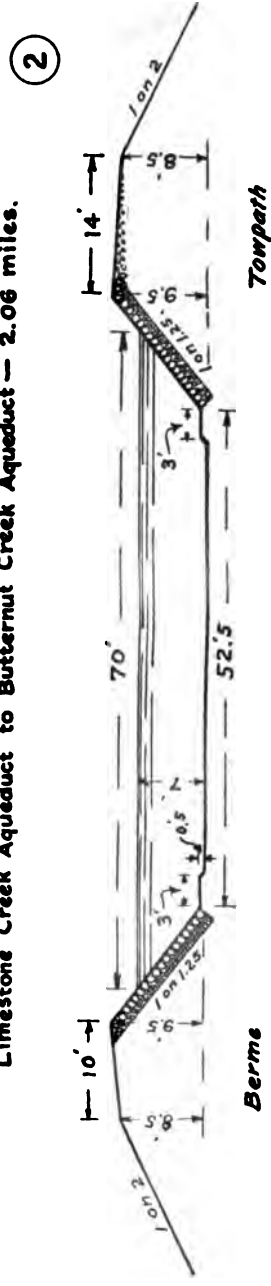
# Exceptional Sections of Erie—Middle Division as enlarged in 1862.

Higginsville to Limestone Creek Aqueduct—24.23 miles.

Jordan level to Wayne County line—17.37 miles.



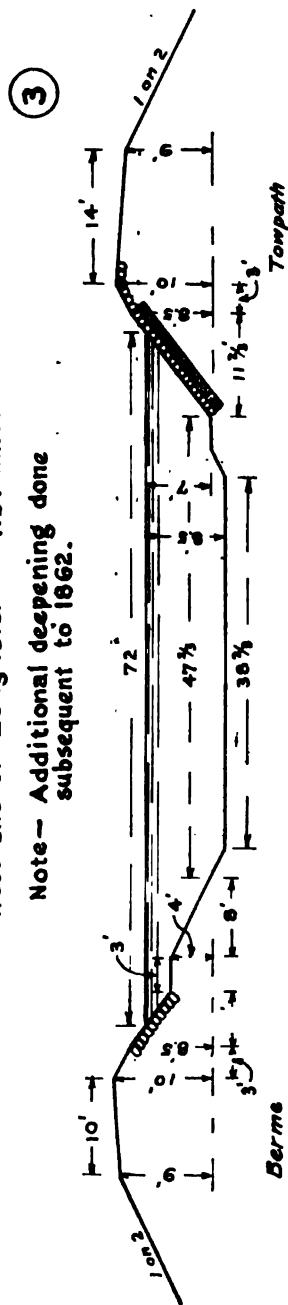
Limestone Creek Aqueduct to Butternut Creek Aqueduct—2.06 miles.



Scale 1 in. = 20 ft.

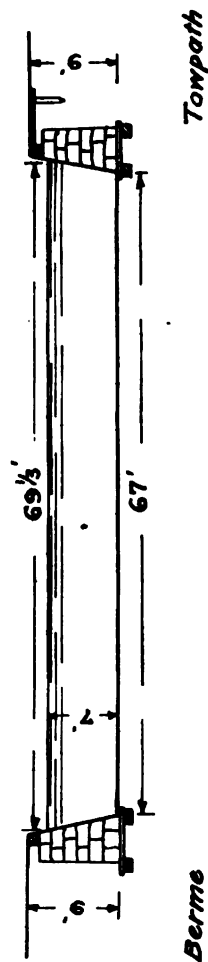
West end of Long level - 4.37 miles

Note - Additional deepening done  
subsequent to 1862.



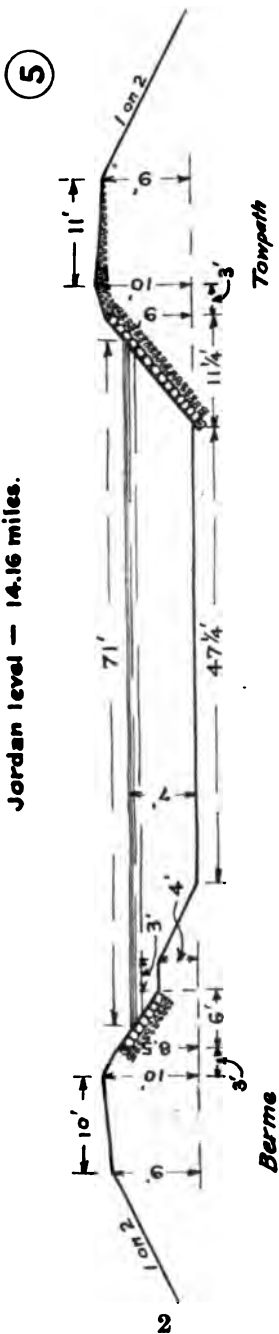
④

Through city of Syracuse.



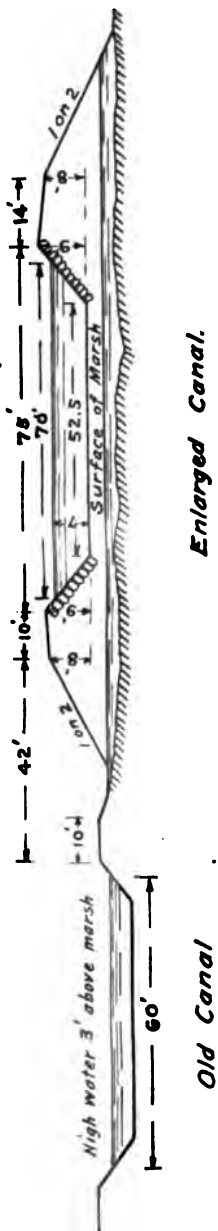
Scale 1 in. = 20 ft.

Jordan level — 14.16 miles.



### Enlargement of Erie west of Montezuma.

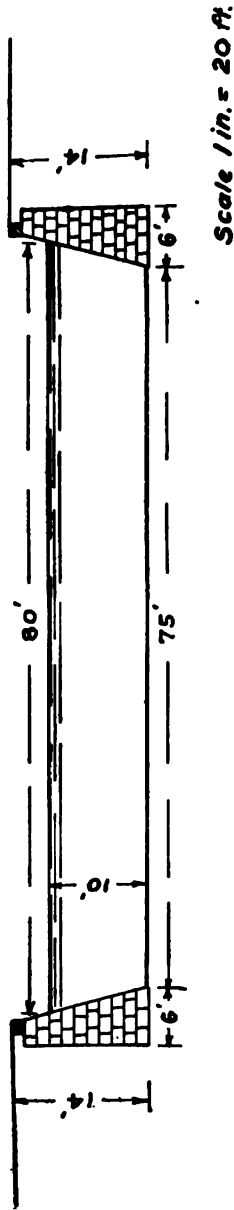
Showing method of constructing original and enlarged canals through marsh.





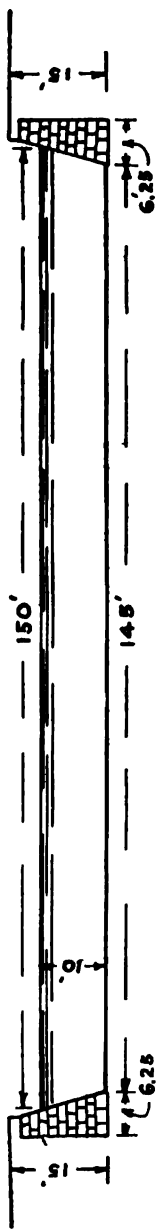
Enlarged Erie Canal sections from, Buffalo to Clyde.  
Commercial Street to Slip No 1. Buffalo.

①



Slip No 1. Buffalo to Black Rock Harbor.

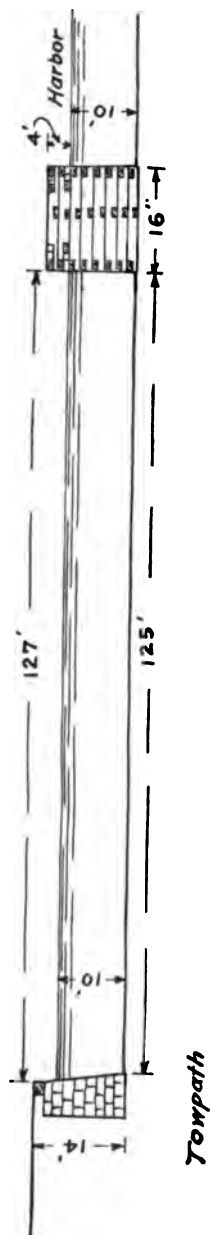
②



Scale 1 in. = 30 ft.

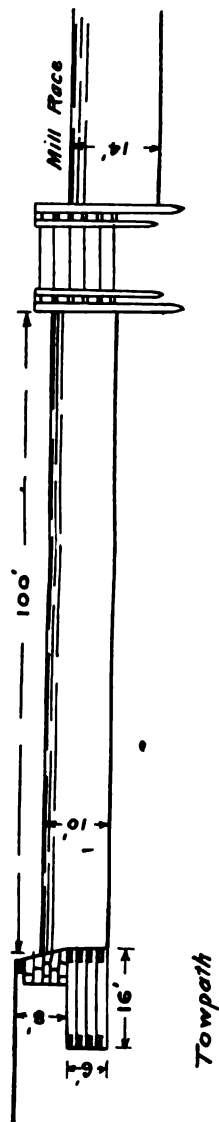
3

Through Harbor to Dam at foot thereof.

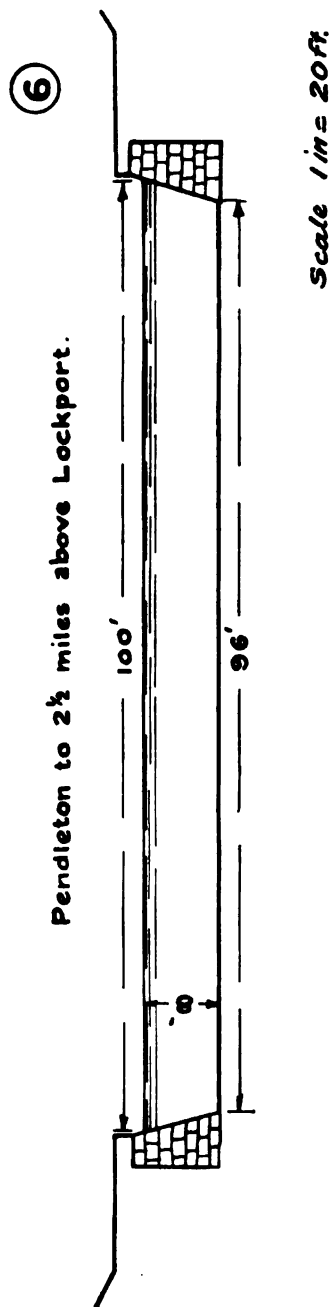
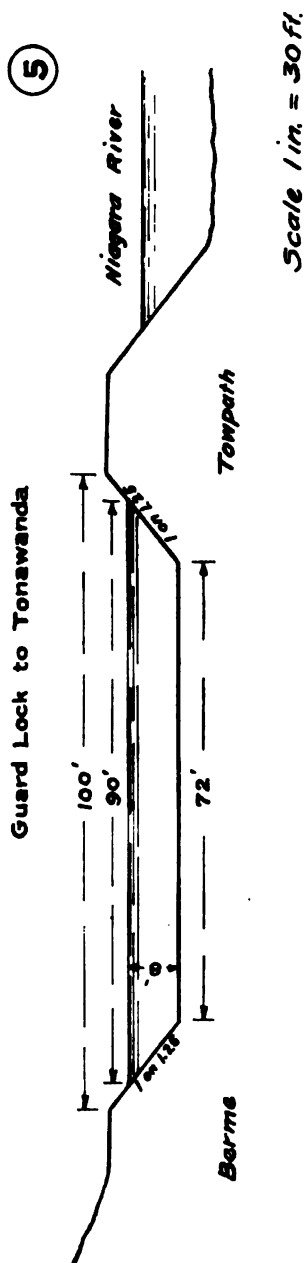


4

Dam to Guard Lock Black Rock.

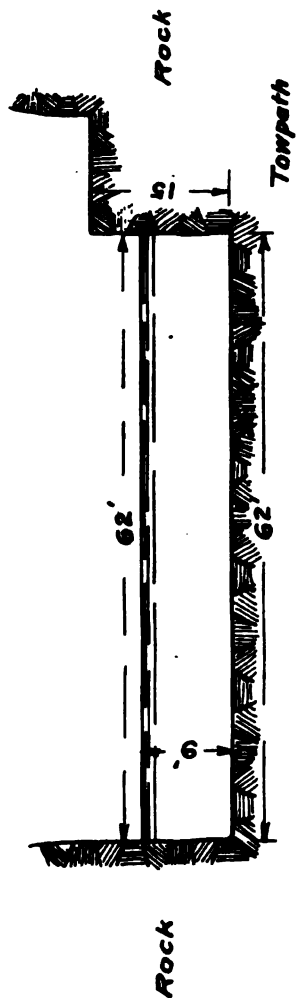


Scale 1 in. = 30 ft.



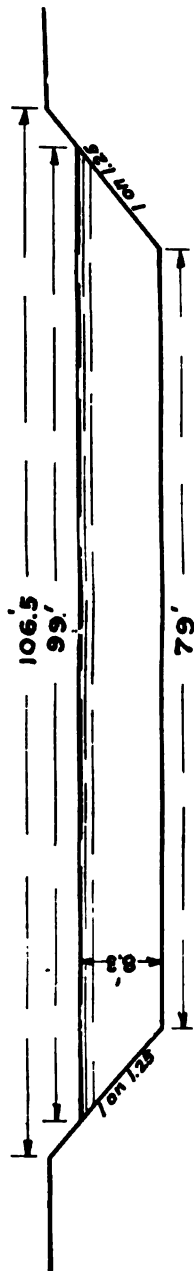
7

2½ miles above Lockport to Lockport.



8

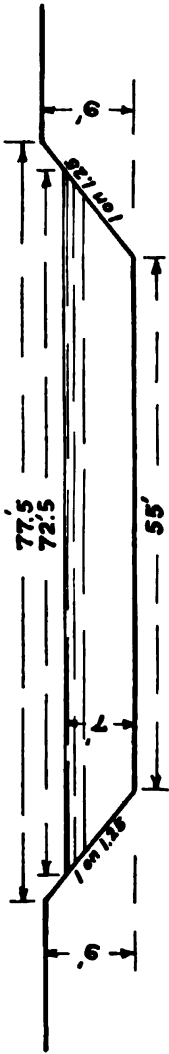
Below Lock at Lockport



Scale 1 in = 20 ft.

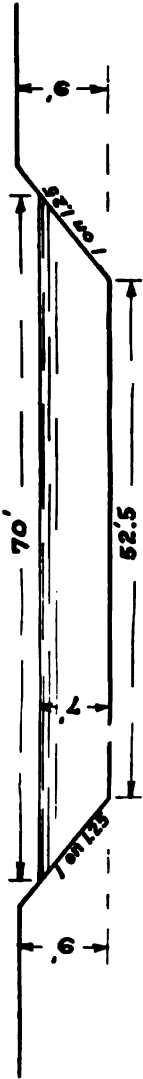
9

At Lyell Street, Rochester

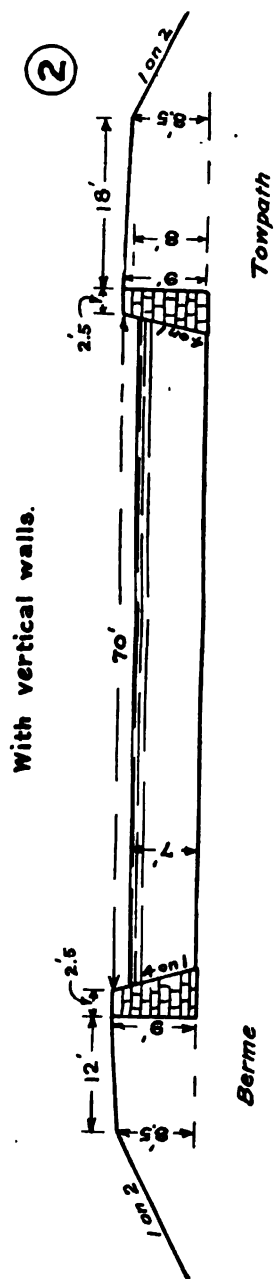
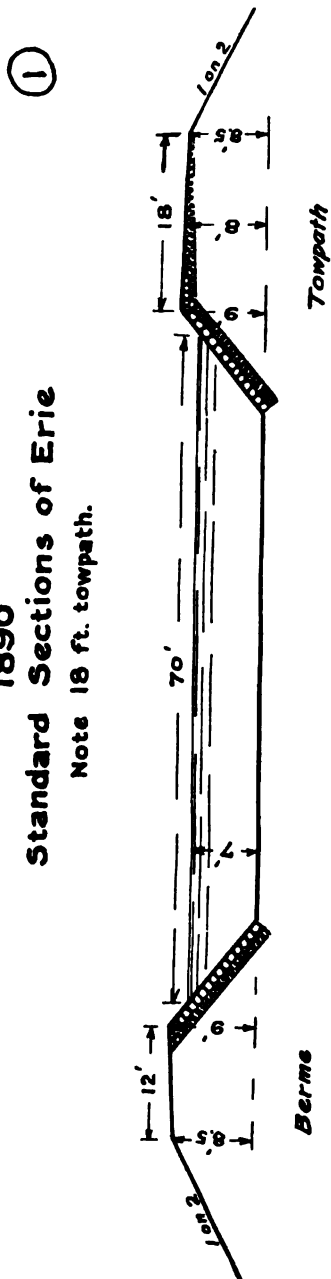


10

General Section East of Rochester.



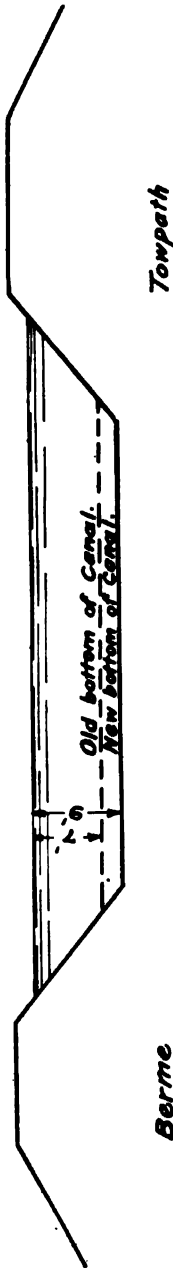
1890  
Standard Sections of Erie  
Note 18 ft. towpath.



Scale 1 in. = 20

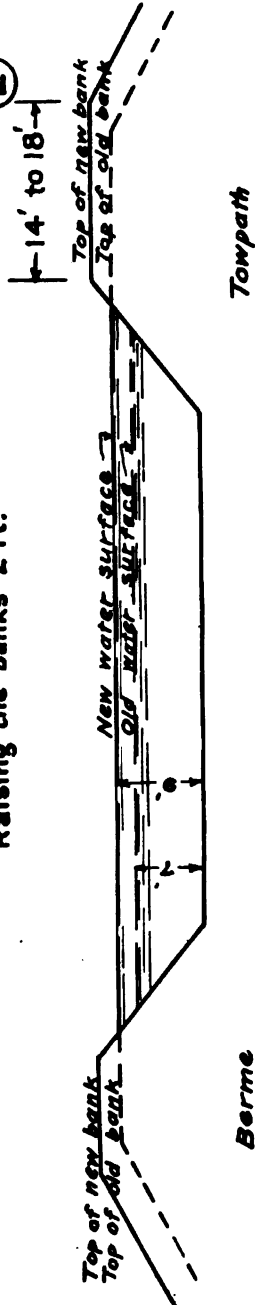
1895  
Methods of deepening the Erie and Oswego Canals  
used in the improvements of 1896 - 1898.  
Excavating 2 ft. from bottom of canal.

①

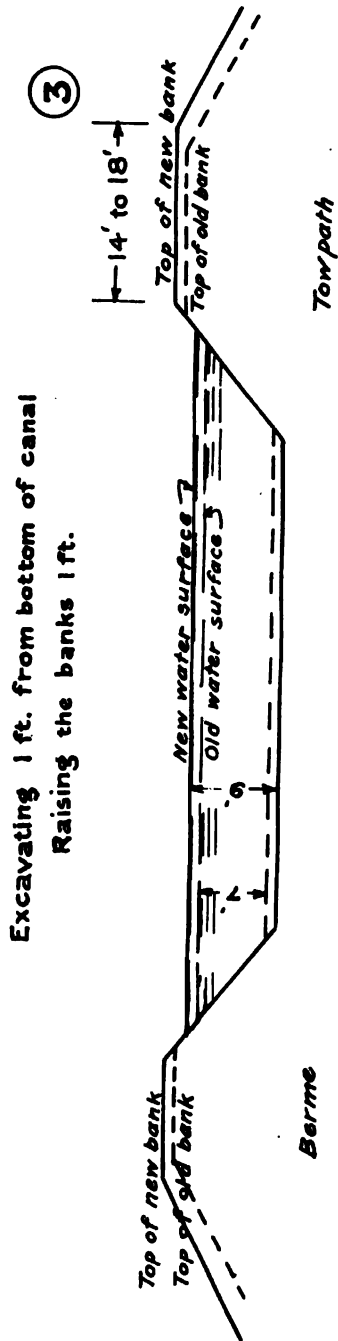


②

Raising the banks 2 ft.



Scale 1 in. = 20 ft.



Scale 1 in. = 20 ft.

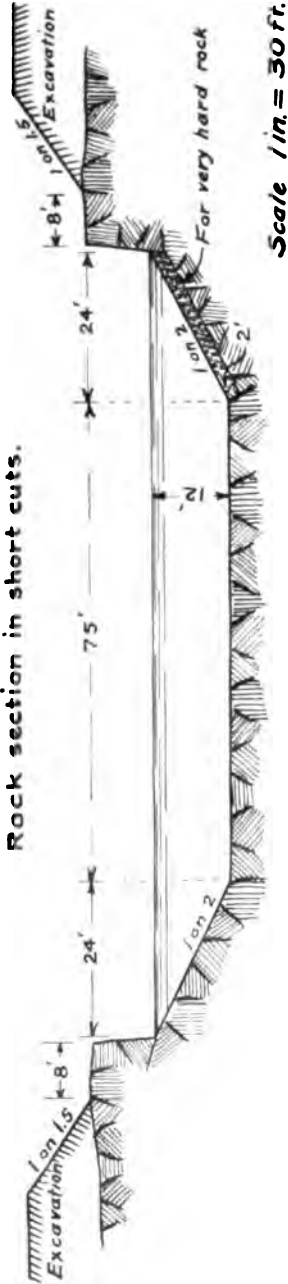
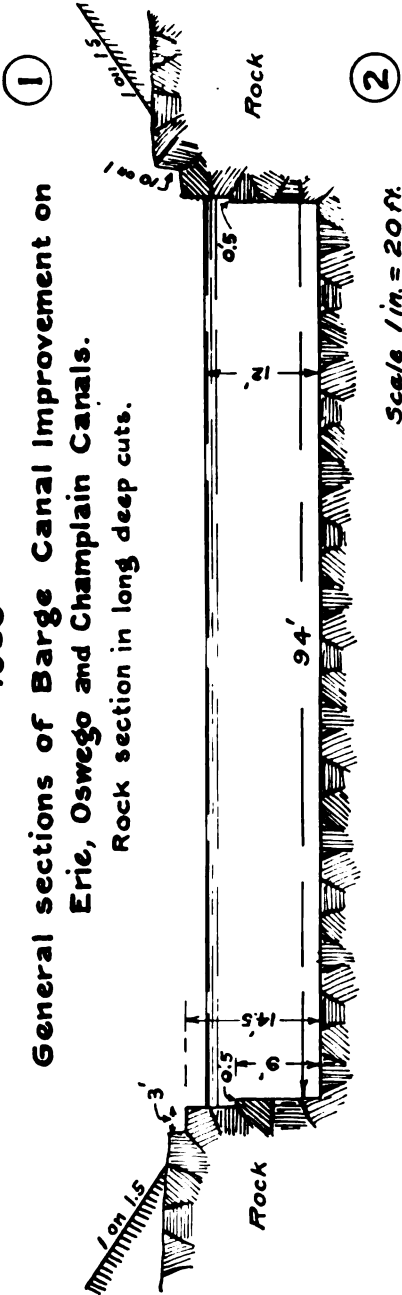
NOTE—Dimensions of enlarged prism depend upon method of improvement and location, as shown by previous sections.

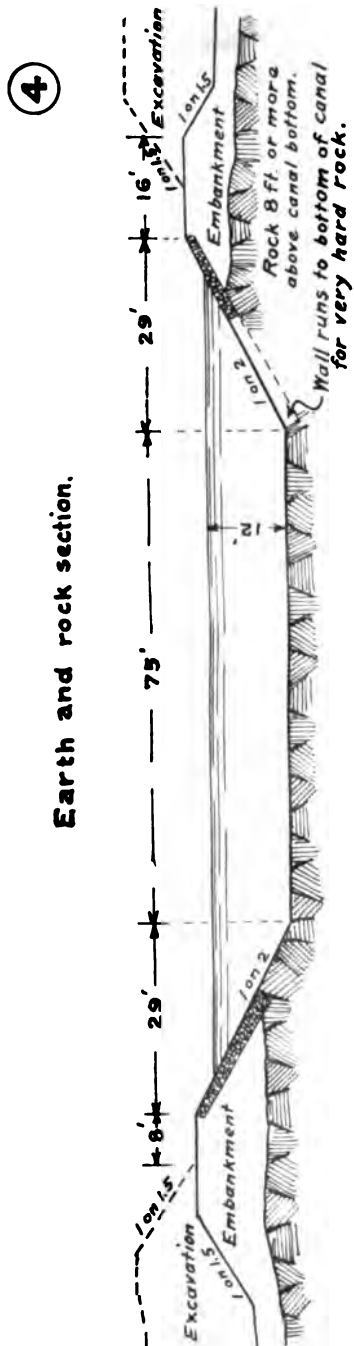


1903

General sections of Barge Canal Improvement on  
Erie, Oswego and Champlain Canals.

Rock section in long deep cuts.

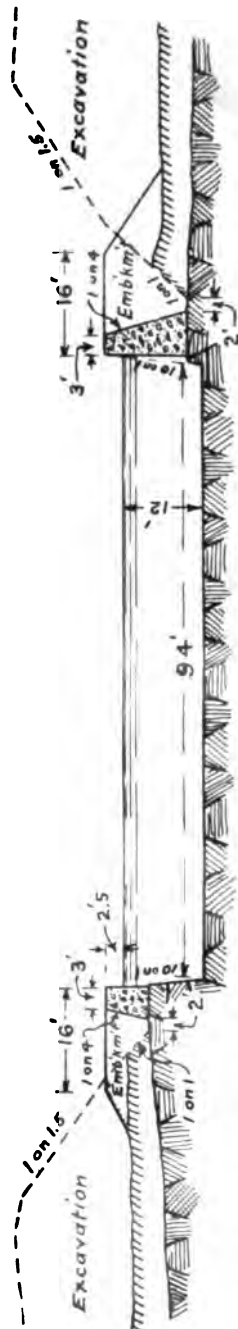




Scale 1 in. = 30 ft.

5

Earth and rock section at ends of long rock cuts.



Scale 1 in. = 30 ft.

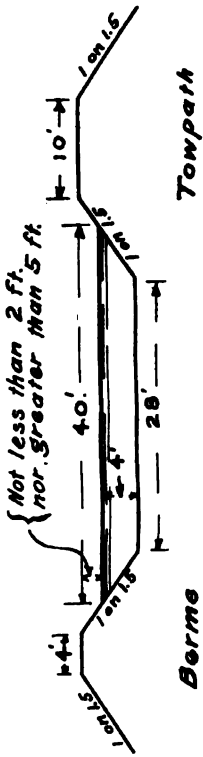
6

River section in rock or rock and earth combined.

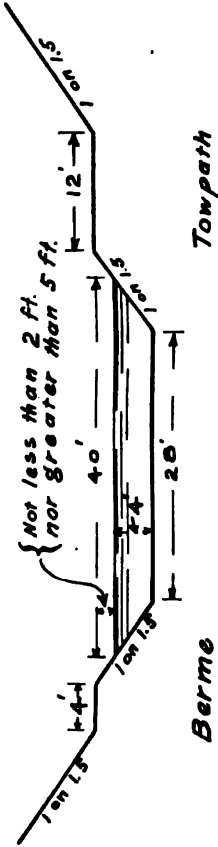


Scale 1 in. = 40 ft.

1818  
Specifications for Champlain in fill or cut of less than 9 ft.

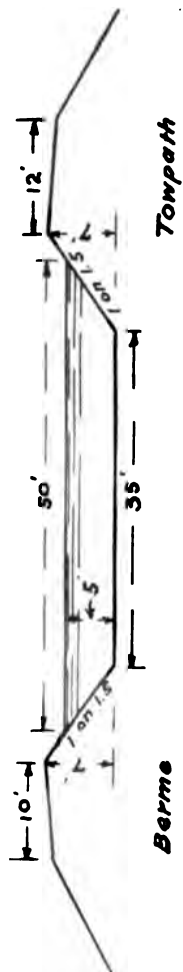


1818  
Specifications for Champlain in cut greater than 9 ft.

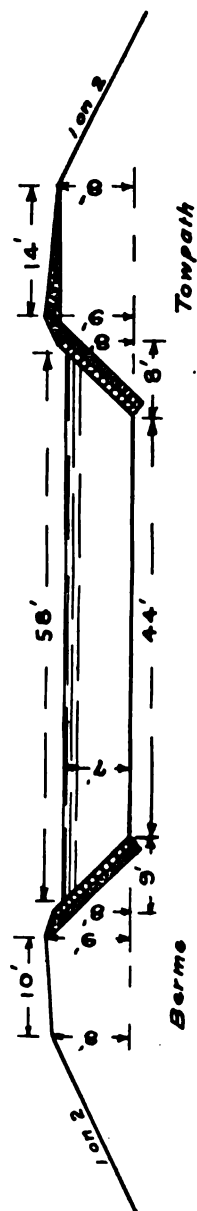


Scale 1 in. = 20 ft.

1860  
Enlargement of Champlain authorized 1860

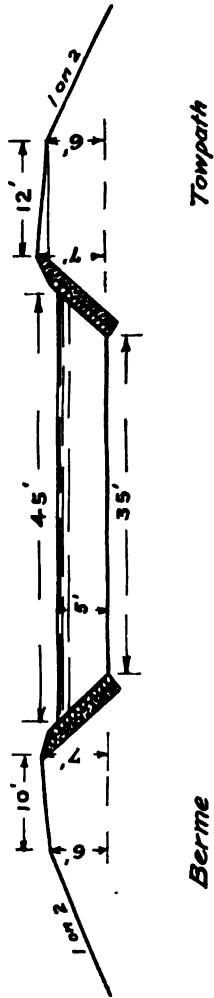


1870  
Enlargement of Champlain authorized 1870  
but never completed.



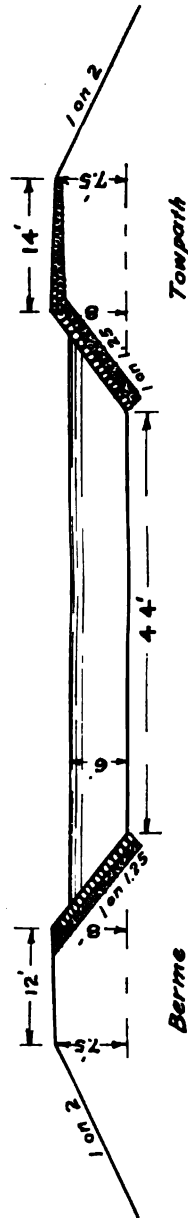
Scale 1 in. = 20 ft.

1875  
The Champlain as it existed in 1875.



1891  
Standard sections of Champlain Canal.

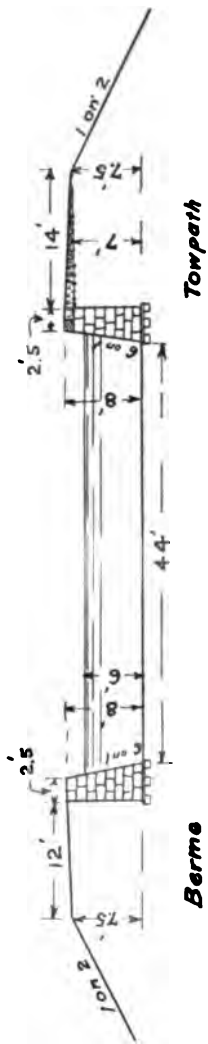
①



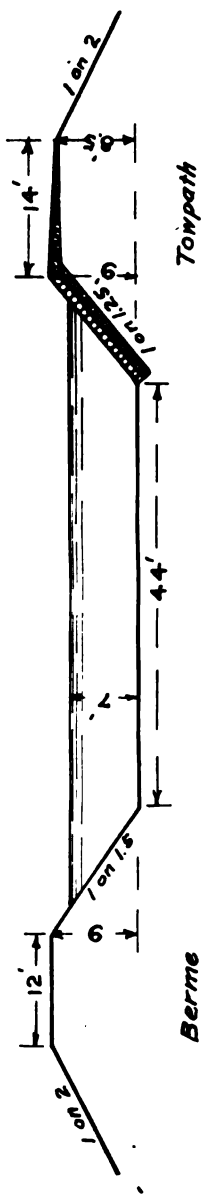
Scale 1/in. = 20 ft.

1891  
With vertical walls.

2

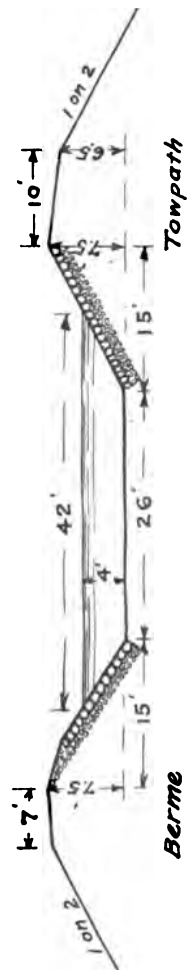


General section of Champlain Improvement of 1896-1898.

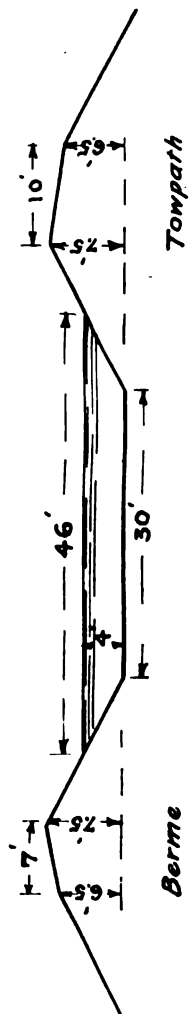


Scale 1 in. = 20 ft.

1852  
Section of Black River Canal.



Section of Black River Canal Feeder.



Scale 1 in. = 20 ft.



EXHIBITING THE DATE OF THE OPENING AND CLOSING OF THE HUDSON RIVER AND THE NUMBER OF DAYS OPEN ; ALSO THE TIME OF COMMENCEMENT AND CLOSE OF EACH NAVIGABLE SEASON OF CANALS AND THE NUMBER OF DAYS OF NAVIGATION SINCE 1824 ; ALSO THE DATE OF THE OPENING OF LAKE ERIE SINCE 1827.

YEAR.	OPENING AND CLOSING OF THE HUDSON RIVER.			COMMENCEMENT AND CLOSE OF NAVIGATION.			Opening of the lake.
	River open.	River closed.	Days open.	Canal open.	Canal closed.	Navigable days.	
1824....	March	3 January	5	309 April	30 December	4	219
1825....	March	6 December	13	283 April	12 December	5	238
1826....	February	25 December	13	302 April	25 December	18	243
1827....	March	20 November	25	251 April	22 December	18	241 April 21
1828....	February	8 December	23	220 March	27 December	20	269 April 1
1829....	April	1 January	14	286 May	2 December	17	230 May 10
1830....	March	15 December	25	283 April	30 December	17	242 May 5
1831....	March	15 December	6	262 April	16 December	1	230 May 8
1832....	March	25 December	31	289 April	25 December	21	241 April 27
1833....	March	21 December	13	277 April	9 December	12	238 April 23
1834....	February	29 December	15	291 April	17 December	12	240 April 6
1835....	March	25 November	30	268 April	15 November	30	230 May 8
1836....	April	4 December	7	244 April	25 November	26	216 April 27
1837....	March	27 December	14	261 April	20 December	9	234 May 16
1838....	March	19 November	5	257 April	11 December	25	228 March 31
1839....	March	25 November	8	286 April	20 December	16	241 April 11
1840....	February	25 November	8	285 April	20 December	9	228 April 27
1841....	March	24 November	19	286 April	24 November	30	221 April 14
1842....	February	4 November	28	308 April	20 November	28	222 March 7
1843....	April	13 December	10	242 May	1 November	30	214 May 6
1844....	March	18 December	17	278 April	18 November	26	222 March 14
1845....	February	24 December	3	283 April	15 November	29	228 April 3
1846....	March	18 December	14	275 April	16 November	25	234 April 11
1847....	April	7 December	25	263 May	1 November	30	214 April 23
1848....	March	22 December	27	292 May	1 December	9	223 April 9
1849....	March	19 December	26	286 May	1 December	5	219 March 25
1850....	March	10 December	17	282 April	22 December	11	234 March 25
1851....	February	25 December	14	293 April	15 December	5	235 April 2
1852....	March	28 December	23	270 April	20 December	15	239 April 20
1853....	March	23 December	21	274 April	20 December	20	245 April 14
1854....	March	17 December	8	266 May	1 December	3	217 April 28
1855....	March	27 December	20	268 May	1 December	10	224 April 21
1856....	April	11 December	14	248 May	5 December	4	214 May 2
1857....	February	27 December	27	302 May	6 December	15	223 April 27
1858....	March	20 December	17	273 April	28 December	8	225 April 15
1859....	March	13 December	10	273 April	15 December	12	242 April 7
1860....	March	6 December	14	283 April	5 December	12	232 April 17
1861....	March	5 December	13	294 May	1 December	10	224 April 13
1862....	April	4 December	19	259 May	1 December	10	224 April 15
1863....	April	3 December	1	252 May	1 December	9	223 April 3
1864....	March	11 December	12	277 April	30 December	8	223 April 13
1865....	March	22 December	16	270 May	1 December	12	226 April 26
1866....	March	20 December	15	270 May	1 December	12	226 April 28
1867....	March	26 December	8	257 May	6 December	20	229 April 21
1868....	March	24 December	5	252 May	4 December	7	217 April 19
1869....	April	5 December	9	248 May	6 December	10	218 May 1
1870....	March	31 December	17	261 May	10 December	8	213 April 16
1871....	March	12 November	29	263 April	24 December	1	220 April 1
1872....	April	7 December	9	247 May	13 December	1	202 May 6
1873....	April	16 November	22	221 May	15 December	5	205 April 29
1874....	March	19 December	12	260 May	5 December	5	215 April 18
1875....	April	13 November	9	229 May	18 November	30	197 May 12
1876....	April	1 December	2	245 May	4 December	1	211 May 4
1877....	March	30 December	31	277 May	8 December	7	214 April 17
1878....	March	14 December	20	282 April	15 December	7	237 March 24
1879....	April	4 December	20	261 May	8 December	6	212 April 24
1880....	March	5 November	25	266 April	20 November	21	216 March 19
881....	March	21 January	2	288 May	by ice		206 May 1
882....	March	8 December	5	273 April	17 December	8	241 March 26
883....	March	29 December	15	261 May	7 December	1	208 May 4

## OPENING AND CLOSING OF THE HUDSON RIVER, ETC.—(Concluded).

YEAR.	OPENING AND CLOSING OF THE HUDSON RIVER.			COMMENCEMENT AND CLOSE OF NAVIGATION.			Opening of the lake.
	River open.	River closed.	Days open.	Canal open.	Canal closed.	Navigable days.	
1884....	March 25	December 19	269	May 6	December 1	209	April 25
1885....	April 7	December 7	247	May 11	December 1	205	May 2
1886....	March 30	December 3	248	May 1	December 1	214	April 25
1887....	April 6	December 28	258	May 7	December 1	209	April 17
1888....	April 7	December 14	252	May 10	December 3	208	April 14
1889....	March 10	Open all win'r	286	May 1	November 30	214	April 10
1890....	Open all year.	December 2	337	April 28	November 30	217	March 31
1891....	March 24	December 24	277	May 5	December 5	215	April 13
1892....	April 1	December 22	268	May 1	December 5	219	April 10
1893....	April 1	December 6	250	May 3	November 30	212	April 15
1894....	March 18	December 24	281	May 1	November 30	214	April 28
1895....	April 2	December 9	252	May 3	December 5	216	April 4
1896....	April 7	December 19	256	May 1	December 1	215	April 19
1897....	April 29	December 7	223	May 8	December 1	208	April 6
1898....	April 13	December 13	244	May 7	December 10	217	March 25
1899....	April 17	December 15	242	April 25	December 1	220	April 28
1900....	April 9	December 11	246	April 25	December 1	220	April 22
1901....	March 28	December 1	248	May 7	November 30	207	April 20
1902....	March 17	December 8	266	April 24	December 4	224	April 9
1903....	March 14	December 2	263	May 2	November 28	210	April 6
1904....	April 4	December 4	244	May 5	November 26	205	May 10
1905....	April 3	December 15	257	May 4	November 28	209	April 22

STATEMENT OF THE TONS OF PROPERTY MOVED ON EACH AND ALL THE CANALS, COMPRISING THE TONS OF TOTAL MOVEMENT.

Y. E. A. R.	Erie.	Cham-plain.	Oswego.	Cayuga and Seneca.	Chemung.	Crooked Lake.	Chenango.	Genesee Valley.	Black River.	Oneida Lake.	Baldwinsville.	Total.
1837	667,151	261,659	161,353	20,274	20,258	24,258	8,213	.....	.....	.....	.....	1,171,296
1838	744,848	266,553	227,607	23,541	20,258	20,336	14,778	.....	.....	.....	.....	1,323,011
1839	845,007	263,553	227,607	26,300	36,089	26,823	16,928	.....	.....	.....	.....	1,435,713
1840	829,090	245,225	210,627	32,480	34,217	24,026	16,848	.....	.....	.....	.....	1,416,046
1841	906,442	276,418	135,689	31,634	63,042	33,030	23,356	13,653	.....	.....	.....	1,531,646
1842	719,310	230,844	130,408	31,716	54,806	18,090	17,177	20,892	.....	22,150	.....	1,531,646
1843	819,216	262,212	240,571	25,098	66,247	31,856	19,026	48,313	.....	26,445	.....	1,513,339
1844	945,644	269,546	326,607	31,068	88,231	32,580	31,472	65,077	.....	25,901	.....	1,816,586
1845	1,038,700	286,925	340,481	46,404	114,768	39,489	38,305	73,546	.....	22,188	.....	1,977,565
1846	1,661,375	313,124	441,090	58,204	124,768	35,536	41,112	87,614	.....	30,642	.....	2,268,692
1847	1,599,055	293,889	400,147	46,252	180,165	36,318	44,051	95,632	.....	47,451	.....	2,849,810
1848	1,622,444	321,345	537,637	40,440	135,867	36,317	35,207	98,467	.....	56,828	.....	2,704,732
1849	1,635,080	460,219	583,346	42,379	128,263	38,707	41,892	89,804	.....	56,828	.....	3,076,617
1850	1,635,080	531,001	684,191	37,084	159,563	29,399	40,307	100,000	25,320	45,049	.....	3,582,733
1851	1,635,080	531,001	684,191	47,275	187,377	35,737	44,839	122,901	36,597	43,969	.....	3,803,441
1852	1,129,334	608,354	761,276	58,763	249,080	53,985	76,538	157,164	41,924	43,351	.....	4,247,853
1853	2,108,308	698,354	611,533	72,965	270,978	25,850	89,390	102,321	55,525	34,532	.....	4,165,892
1854	2,224,008	537,108	654,399	76,744	223,271	25,850	89,390	102,321	51,347	27,116	.....	4,165,892
1855	2,202,078	611,610	654,399	76,744	223,271	25,850	89,390	102,321	68,126	18,485	.....	4,165,892
1856	1,566,024	547,236	605,218	131,907	245,621	16,571	96,722	113,731	69,135	19,343	.....	4,116,082
1857	1,767,004	608,918	688,040	120,435	187,201	16,571	96,722	113,731	69,135	19,343	.....	3,344,061
1858	1,753,954	751,046	612,390	75,968	205,168	16,318	72,526	118,576	62,352	19,675	.....	3,645,192
1859	2,253,553	681,157	1,080,076	80,692	256,323	17,933	89,691	124,263	70,946	19,536	.....	3,781,648
1860	2,500,782	545,930	852,920	98,678	226,051	14,723	83,635	123,602	75,946	18,672	.....	4,650,214
1861	3,204,277	617,318	1,063,413	125,659	208,792	12,259	91,661	94,329	69,930	30,060	.....	4,507,635
1862	2,500,782	878,920	992,173	119,704	307,151	11,230	99,215	129,974	85,442	.....	.....	5,598,785
1863	2,535,302	846,790	765,079	185,161	280,834	6,316	89,021	112,549	90,448	.....	.....	5,598,785
1864	2,535,302	846,790	765,079	185,161	280,834	6,316	89,021	112,549	90,448	.....	.....	5,598,785
1865	2,529,490	815,311	825,649	192,312	164,796	9,376	89,021	112,549	90,448	.....	.....	5,598,785
1866	2,806,027	1,001,493	990,809	368,233	226,617	12,189	107,472	56,581	73,317	.....	.....	4,832,941
1867	2,920,078	1,047,440	940,136	349,704	145,627	12,189	107,472	56,581	85,908	.....	.....	4,729,654
1868	3,346,086	1,120,585	958,444	515,295	165,875	6,558	103,064	64,679	85,908	.....	.....	5,688,325
1869	3,845,032	1,059,339	934,638	533,516	245,617	4,551	112,455	138,304	79,770	.....	.....	6,442,225
1870	3,083,132	1,143,719	917,728	527,728	206,535	7,541	83,327	79,733	80,550	.....	.....	5,859,080
1871	3,580,920	1,099,995	941,858	445,186	173,281	15,825	102,820	69,793	89,329	.....	.....	6,173,769
1872	3,562,562	1,449,528	832,490	346,977	217,263	12,145	26,519	96,113	94,776	.....	.....	6,467,888
1873	3,602,535	1,195,390	655,588	437,362	257,962	17,145	30,317	86,770	86,017	.....	.....	6,673,370
1874	3,097,122	1,268,292	665,408	378,825	205,062	9,286	33,059	69,393	77,601	.....	.....	5,804,588
1875	2,787,226	1,077,746	486,530	224,402	129,425	.....	23,769	64,677	65,927	.....	.....	4,859,858
1876	2,418,422	910,151	370,330	137,264	214,448	.....	6,227	47,360	67,927	.....	.....	4,172,129

1877	3,254,397	1,021,782	319,327	247,864	12,026	37,311	63,286	4,955,963
1878	3,608,634	1,040,912	257,254	168,201	8,767	18,569	68,983	5,171,320
1879	3,820,027	1,012,005	333,713	117,027			79,900	5,362,372
1880	4,608,651	1,200,503	427,863	125,331			75,308	6,457,656
1881	3,598,721	986,079	394,542	99,617			100,233	5,179,192
1882	3,694,364	1,097,343	445,295	123,488			106,933	5,467,423
1883	3,587,102	1,366,358	276,350	134,631			128,656	5,604,056
1884	3,389,555	1,118,073	260,541	119,990			116,359	5,009,498
1885	3,208,207	1,139,402	213,079	64,125			106,971	4,731,784
1886	3,808,642	1,119,663	186,484	64,995			114,198	5,283,982
1887	3,840,513	1,229,335	176,177	195,933			111,847	5,553,905
1888	3,321,516	1,198,305	134,078	201,237			118,213	4,942,948
1889	3,673,554	1,187,038	170,078	196,138			143,561	5,370,369
1890	3,303,929	1,520,757	225,836	63,419			132,061	5,246,102
1891	3,097,853	1,101,126	161,426	80,954			122,111	4,563,472
1892	2,978,832	1,021,139	90,866	75,669			115,469	4,281,995
1893	3,235,726	848,965	92,634	38,761			115,877	4,331,963
1894	3,144,144	550,279	98,843	33,270			56,024	3,882,660
1895	2,356,084	966,335	64,154	49,050			64,691	3,500,314
1896	2,742,438	802,519	57,345	54,739			57,953	3,714,894
1897	2,584,906	797,637	53,537	110,277			71,447	3,617,804
1898	2,338,020	804,076	47,662	100,342			69,963	3,360,063
1899	2,419,084	1,034,315	49,373	113,476			69,803	3,686,051
1900	2,145,876	972,867	31,742	130,126			65,330	3,345,841
1901	2,257,035	865,641	43,210	166,258			68,469	3,420,613
1902	2,105,876	766,615	143,707	155,152			103,260	3,274,610
1903	2,414,018	801,649	184,434	116,918			98,366	3,513,285
1904	1,946,708	796,468	170,342	140,656			85,373	3,138,347
1905	1,999,824	833,550	178,777	123,927			90,818	3,226,896

*Compiled from reports of Canal Commissioners, 1820-1826, inclusive; from reports of Commissioners of Canal Fund, 1827-1847, inclusive; from reports of Auditors of Canal Department, 1848-1882, inclusive.*

[illegible]

[illegible]

[illegible]

1860.....	30,232 68	287 97	187 81	886 80	143 63	6,113 52	28 63	3,009,597 04
1861.....	23,806 30	210 92	229 89	1,127 88	143 96	6,827 88	19 30	3,908,784 81
1862.....	35,921 70	70 96	527 70	3,908 57	318 52	9,834 18	44 56	5,188,943 14
1863.....	34,303 39	39 43	503 50	4,392 59	376 96	11,641 98	35 82	4,646,207 11
1864.....	24,033 83	.....	375 36	2,481 22	304 23	11,200 05	.....	3,983,981 83
1865.....	14,465 06	.....	400 02	2,474 48	240 20	10,658 30	.....	3,839,954 80
1866.....	25,979 88	.....	392 07	3,286 42	287 94	13,003 27	.....	4,436,637 30
1867.....	18,669 59	.....	310 25	2,271 80	344 77	11,159 90	.....	4,088,057 94
1868.....	26,169 08	.....	342 42	2,142 83	642 58	10,988 81	.....	4,246,563 56
1869.....	17,094 34	.....	378 08	1,145 41	290 46	11,489 08	.....	3,778,501 18
1870.....	19,172 74	.....	171 05	786 24	258 40	12,515 87	.....	2,611,577 68
1871.....	18,730 26	.....	131 47	584 09	194 50	11,207 61	.....	3,100,838 82
1872.....	20,514 13	.....	222 05	798 52	423 20	11,090 58	.....	3,072,411 72
1873.....	20,349 84	.....	137 43	465 13	472 89	10,072 24	.....	2,976,718 47
1874.....	13,016 88	.....	95 66	432 89	306 51	10,523 96	.....	2,637,070 92
1875.....	7,585 34	.....	36 49	206 33	394 58	5,726 61	.....	1,590,032 25
1876.....	21,022 81	.....	149 07	499 13	324 75	16,180 87	.....	1,340,003 30
1877.....	13,295 70	6 68	142 93	446 92	82 67	15,301 52	.....	880,895 20
1878.....	6,266 37	16 21	33 67	130 80	125 21	10,879 72	.....	993,348 38
1879.....	.....	.....	38 24	124 25	66 02	9,617 80	.....	941,573 97
1880.....	.....	.....	29 73	328 80	73 74	12,759 80	.....	1,135,418 84
1881.....	.....	.....	30 28	430 97	80 56	12,067 91	.....	632,389 97
1882.....	.....	.....	29 91	341 53	92 29	13,305 37	.....	656,826 00
Total.....	\$852,164 06	\$65,398 68	\$10,542 35	\$220,145 38	\$8,824 71	\$305,503 92	\$1,243 33	\$134,900,020 58

\*Appears in Auditor's Report as \$3,118,244.02.



STATEMENT SHOWING THE TOTAL REVENUES FROM TOLLS, INTEREST ON TOLL DEPOSITS AND MISCELLANEOUS SOURCES; THE TOTAL EXPENDITURES FOR SUPERINTENDENCE, COLLECTION AND ORDINARY REPAIRS; THE PROFIT OR LOSS IN OPERATING EACH CANAL, AND THE TOTAL COST FOR CONSTRUCTION AND IMPROVEMENTS (EXCLUSIVE OF INTEREST PAID ON CANAL LOANS), BEGINNING WITH THE YEAR IN WHICH THE FIRST EXPENDITURE WAS MADE ON CONSTRUCTION ACCOUNT, AND BROUGHT DOWN TO THE CLOSE OF THE FISCAL YEAR WHICH ENDED SEPTEMBER 30, 1882.†

CANALS.	Revenues.	Cost of collection, superintendence and ordinary repairs.	Loss in operating.	Profit in operating.	Cost of construction and improvements.
Baldwinsville.....	\$1,261 48	\$18,038 58	\$16,777 10	.....	*\$31,000 52
Black River.....	301,098 63	1,552,229 98	1,251,131 53	.....	3,894,952 30
Cayuga Inlet.....	8,837 02	1,552,229 98	.....	.....	*2,020 00
Cayuga and Seneca.....	1,054,325 96	1,027,538 57	.....	\$7,843 39	1,834,184 40
Champlain.....	6,416 241 37	5,830,023 39	.....	26,817 39	4,913,295 79
Chemung.....	525,545 29	2,022,238 99	1,496,693 70	786,317 98	1,463,585 57
Chemung.....	744,027 11	2,081,738 85	1,337,711 74	.....	4,789,470 58
Crooked Lake.....	45,490 41	424,658 44	379,168 03	.....	395,091 54
Erie.....	121,461 871 09	29,270,301 16	.....	92,191,569 63	49,591,852 98
Genesee Valley.....	890,164 78	2,814,808 87	1,954,643 89	.....	6,737,430 56
Oneida Lake.....	65,893 76	2,144,060 80	78,166 84	.....	6,511,649 36
Oneida River improvement.....	217,100 36	41,170 47	.....	175,929 89	224,072 33
Oswego.....	3,708,547 74	3,371,448 14	.....	337,101 60	4,396,372 56
Seneca River towing-path.....	7,770 10	3,371,448 14	.....	7,750 56	1,602 05
Totals.....	\$135,418,325 10	\$48,399,286 99	\$86,514,292 63	\$93,533,330 74	\$78,685,590 93

\*Does not include payments from the general fund.

†Taken from Auditor's report for 1882 (Assembly Document No. 4, 1883), p. 12.

TABLES OF EXISTING STRUCTURES ON CANALS.  
TABLES OF STRUCTURES ON THE ERIE CANAL.  
TABLE OF AQUEDUCTS.

No.	NAME.	Location: between locks.	Continuous stations* Hudson river junction.	INTERIOR WIDTH.		Number of spans.	TOTAL LENGTH.		Elevation of spillway.	Number of gates.
				Feet.	Inches.		Feet.	Inches.		
Eastern Division.†										
1	Lower Mohawk	18 and 19	668 + 50	40		6	1,137		188.889	
2	Upper Mohawk	22 and 23	1,315 + 35	44		0	510	0	230.822	
3	Flat Stone creek, Van Slykes	24 and 25	1,790 + 50	52		4	67	7	247.014	
4	Sousakill, Hoffman's	25 and 26	2,028 + 99	54		6	111	3	254.382	
5	Schoharie creek	30 and 31	2,985 + 80	41		6	624	10	297.232	
6	Tokkon creek	30 and 31	3,116 + 97	50		3	105	6	296.987	
7	Leonardson creek, Yatesville	30 and 31	3,236 + 70	50		7	105	1	297.052	
8	Lasher's	30 and 31	3,294 + 84	51		0	79	0	296.280	
9	Plattskill, Sprakers	31 and 32	3,413 + 27	50		0	128	0	302.555	
10	Bauman's creek, Canajoharie	31 and 32	3,575 + 90	50		0	128	0	302.985	
11	Oscuago creek, Fort Plain	32 and 33	3,755 + 63	50		6	128	0	311.429	
12	Castle creek, Indian Castle	35 and 36	4,322 + 07	50		6	128	0	333.167	
13	Fulmer's creek, Mohawk	43 and 44	5,053 + 88	65		6	74	0	405.100	
14	Steel creek, Ilion	43 and 44	5,137 + 33	51		6	50	0	405.200	
15	Moyer creek, Frankfort	45 and 46	5,261 + 53	66		2	50	0	426.100	
16	Ferguson creek	45 and 46	5,558 + 46	57		6	22	0	426.972	
Middle Division.‡										
1	Sauquoit creek	46 and 47	5,913 + 89	56		54	77	0	430.244	6
2	Oriskany creek	46 and 47	6,108 + 33	54		11	105	0	428.159	8
3	Cowassalon creek	46 and 47	7,448 + 69	53		0	51	6	428.139	3
4	Chittenango creek	46 and 47	7,982 + 63	50		6	76	0	426.246	3
5	Limestone creek	46 and 47	8,405 + 98	49		10	79	10	429.346	3
6	Butternut creek	46 and 47	8,515 + 25	50		0	80	0	429.633	3
7	Nine Mile creek	50 and 51	9,210 + 04	49		0	144	0	409.692	4
8	Jordan	50 and 51	9,786 + 07	50		0	105	6	410.000	3
9	Centerport	51 and 52	10,101 + 25	49		1	75	6	404.262	3
10	Port Byron	51 and 52	10,239 + 01	50		0	98	0	404.944	2
11	Crane brook	52 and 53	10,410 + 87	51		2	72	0	394.465	6
12	Seneca river	52 and 53	10,516 + 94	50		31	840	0	393.012	14
*Distances taken to centers of aqueducts. †106.35 miles from river junction to Oneida county line. ‡97.07 miles from Oneida county line to Wayne										

\*Distances taken to centers of aqueducts. †106.35 miles from river junction to Oneida county line. ‡97.07 miles from Oneida county line to Wayne county line.  
NOTE:—All elevations in these Tables of Existing Structures on Canals have mean tide at New York as zero of the datum plane, and were derived by using bench marks established by the Barge canal levels of 1901, which started from the "Grist Mill" bench mark at Greenbush (Rensselaer), N. Y., with an elevation of 14.730.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

## TABLE OF AQUEDUCTS—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river Junction.	INTERIOR WIDTH.		Number of spans.	TOTAL LENGTH.		Elevation of spillway.	Number of gates.
				Feet.	Inches.		Feet.	Inches.		
Western Division.†										
1	Lyons.....	55 and 56	11,515+03	50	0	5	130	0	412.087	5
2	Palmira.....	59 and 60	12,306+90	50	0	3	94	0	445.950	6
3	Rochester.....	60 and 61	13,094+19	43	0	10	800	0	.....	.....
4	Medina.....	66 and 67	16,011+65	34	0	1	80	0	.....	.....

\*Distances taken to center of aqueducts.

†147.88 miles from Wayne county line to center of Commercial slip, Buffalo.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF BRIDGES.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Eastern Division.														
1	Water St., Albany.....	1 and	1+64 Street.	Lift.	Iron.	19	0		1	16	6	1	4	0
2	Lawrence St., Albany.....	1 and	9+05 Street.	Swing.	Iron.	111	5		1	16	5	1	4	4
3	Ferry St., Albany.....	1 and	12+35 Street.	Lift.	Iron.	85	01		1	22	0	2	6	5
4	Bridge St., Albany.....	1 and	36+66 Street.	Lattice.	Iron.	89			1	19	8			
5	Erie St., Albany.....	1 and	55+92 Foot.	Suspension.	Iron.	104						1	6	0
6	Garrabrant's.....	1 and	97+38 Farm.	Whipple	Wood.	71	3		1	11	0			
6a	Delaware & Hudson R. R.	2 and	125+00 Railroad.	Lattice.	Iron.	127			1	12	0			
7	Goway Lane.....	2 and	141+25 Highway.	Whipple	Wood.	72	2		1	11	4			
8	Island Park, Menands.....	2 and	154+75 Highway.	Arch.	Iron.	79			1	15	9			
9	Lundrigan.....	2 and	169+62 Highway.	Whipple	Wood.	81	7		1	13	0			
10	Leary.....	2 and	188+89 Highway.	Whipple	Wood.	83	0		1	13	3			
11	Schuyler's Lane.....	2 and	208+00 Highway.	Whipple	Wood.	83	0		1	14	1			
12	Fifth St., Watervliet.....	2 and	226+54 Street.	Whipple	Wood.	76	7		1	16	6			
13	Sixth St., Watervliet.....	2 and	232+17 Foot.	Suspension.	Iron.	93	0					1	5	10
14	Seventh St., Watervliet.....	2 and	238+00 Street.	Whipple	Iron.	82	11		1	15	6	1	7	10
15	Ninth St., Watervliet.....	2 and	243+40 Street.	Warren	Iron.	97	6		1	17	0	2	4	8
15a	United States Arsenal.....	2 and	254+73 Railroad.	Trapezoidal	Iron.	100	0		1	16	0			
15b	United States Arsenal.....	2 and	260+75 Street.	Whipple	Wood.	100	0		1	18	0			
15c	United States Arsenal.....	2 and	265+62 Street.	Arch.	Iron.	100	0		1	18	0			
16	Thirteenth St., Watervliet.....	2 and	271+90 Street.	Arch.	Iron.	91	0		1	15	4	2	5	4
17	Fourteenth St., Watervliet.....	2 and	277+58 Street.	Whipple	Wood.	80	10		1	14	6	2	3	3
18	Fifteenth St., Watervliet.....	2 and	282+00 Foot.	Trapezoidal	Iron.	92	0		1	17	9	2	6	7
19	Sixteenth St., Watervliet.....	2 and	289+40 Street.	Arch.	Iron.	84	4		2	22	0	2	5	0
20	Seventeenth St., Watervliet.....	2 and	296+90 Street.	Lift.	Iron.	66	6		1	22	0	2		
21	Eighteenth St., Watervliet.....	2 and	305+54 Change.	Arch.	Iron.	94	4		1	8	3	1	7	0
22	Nineteenth St., Watervliet.....	2 and	306+64 Street.	Plate girder	Iron.	90	0		1	19	0	1	7	0
23	Twentieth St., Watervliet.....	2 and	316+42 Street.	Arch.	Iron.	82	0		2	16	4	2	5	9
23a	N. Y. C. & D. & H. R. R.	2 and	330+40 Railroad.	Lattice.	Iron.	100	0		2	40	0			
23b	Green Island.....	2 and	339+58 H w y & change	Trapezoidal	Iron.	125	3		2	19	8	0		
23c	D. & H. Railroad.....	3 and	357+19 Railroad.	Trapezoidal	Iron.	140	0		2	26	0	0		

\*Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Eastern Division—(Continued).														
24	Colonie.....	4 and 5	362 + 47 Highway.....	Towne.....	Wood.....	109	5	1	12	2	1	6	6	
25	Alexander St., Cohoes.....	8 and 9	414 + 82 Street.....	Arch.....	Iron.....	109	4	1	15	0	1	6	6	
26	Columbia St., Cohoes.....	12 and 13	448 + 07 Street.....	Arch.....	Iron.....	110	3	1	15	2	2	7	8	
27	High St., Cohoes.....	13 and 14	459 + 39 Street.....	Trapezoidal.....	Iron.....	110	0	1	17	6	2	5	4	
28	Viet St., Cohoes.....	15 and 16	487 + 03 Street.....	Whipple.....	Iron.....	120	5	1	15	2	2	6	6	
28a	Viet water mains, private.....	15 and 16	487 + 22 Water mains.....	Arch.....	Iron.....	121	0	1	8	0				
29	Lock No. 17, private.....	17 and 18	514 + 10 Farm.....	Whipple.....	Wood.....	101	1	1	14	3				
30	Manor Ave., private.....	18 and 19	526 + 16 H'w'y & change.....	Trapezoidal.....	Iron.....	83	8	1	18	0				
31	Cement mill, private.....	18 and 19	554 + 79 Farm.....	Whipple.....	Wood.....	99	10	1	11	1				
32	Wide water.....	18 and 19	601 + 64 Farm.....	Whipple.....	Wood.....	72	4	1	11	1				
33	Jesse Ponda.....	18 and 19	628 + 69 Farm.....	Whipple.....	Wood.....	70	4	1	11	1				
34	Aqueduct.....	18 and 19	661 + 00 H'w'y & change.....	Arch.....	Iron.....	71	7	1	13	6	1	8	0	
35	Crescent.....	18 and 19	678 + 14 Highway.....	Whipple.....	Wood.....	85	10	1	15	6				
35a	Freemas, private.....	18 and 19	717 + 35 Foot.....	Suspension.....	Wood.....	72	6				1	4		
35b	Union Spring, private.....	18 and 19	724 + 65 Foot.....	Suspension.....	Wood.....	70	10	1	11	9				
36	Newton.....	18 and 19	741 + 39 Farm.....	Whipple.....	Wood.....	71	2	1	15	9				
37	Wonderford.....	18 and 19	760 + 78 Farm.....	Whipple.....	Wood.....	71	4	1	11	9				
38	Dunsback Ferry.....	18 and 19	802 + 28 Highway.....	Whipple.....	Wood.....	89	10	1	15	10				
39	Clute.....	18 and 19	855 + 04 Highway.....	Whipple.....	Wood.....	69	10	1	12	3				
40	Clute.....	18 and 19	861 + 34 Farm.....	Whipple.....	Wood.....	68	11	1	11	11				
41	Pease.....	18 and 19	875 + 48 Highway.....	Whipple.....	Wood.....	68	11	1	12	1				
42	Van Vranken.....	18 and 19	891 + 04 Farm.....	Whipple.....	Wood.....	71	5	1	14	10				
43	Whitehead dock.....	18 and 19	912 + 09 Highway.....	Pin and link.....	Iron.....	70	7	1	11	11				
44	Clute.....	18 and 19	935 + 83 Farm.....	Whipple.....	Wood.....	68	10	1	12	0				
45	Pease.....	18 and 19	940 + 96 Farm.....	Whipple.....	Wood.....	72	7	1	11	11				
46	Van Vranken.....	18 and 19	951 + 72 Farm.....	Whipple.....	Wood.....	71	5	1	12	1				
47	McDermott.....	18 and 19	974 + 83 Farm.....	Whipple.....	Wood.....	72	6	1	12	1				
48	Vischer's Ferry.....	19 and 20	1 030 + 77 Highway.....	Whipple.....	Wood.....	71	3	1	13	3				
49	Funda's Basin.....	20 and 21	1 201 + 59 Highway.....	Whipple.....	Wood.....	71	5	1	12	3				
49a	Feeder.....	20 and 21	1 268 + 11 Township.....	Whipple.....	Wood.....	42	11	1	11	11				
50	Aqueduct.....	21 and 22	1 306 + 50 H'w'y & change.....	Arch.....	Iron.....	93	1	1	12	4				
51	Rexford Flats.....	22 and 23	1 423 + 63 Highway.....	Plate girder.....	Iron.....	75	3	1	16	0	1	7	4	

[illegible]

\*Distances taken to centers of tow-path abutments.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Eastern Division—(Continued).														
96	Starin	30 and 31	3,033 + 33	Farm.	Whipple	Wood	72		1	12	0			
97	Van Dusen	30 and 31	3,081 + 97	Farm.	Whipple	Wood	71		2	1	12	0		
98	Conover	30 and 31	3,163 + 97	Farm.	Whipple	Wood	71		10	1	12	0		
99	Yates, C and M.	30 and 31	3,214 + 55	Farm.	Whipple	Wood	71		10	1	12	0		
100	Yates, Liberty	30 and 31	3,224 + 12	Farm.	Whipple	Wood	70		11	1	12	0		
101	Yates A.	30 and 31	3,260 + 36	Farm.	Whipple	Wood	70		6	1	12	0		
101a	Downing-Lasher	30 and 31	3,298 + 58	Highway.	Trapezoidal	Wood	93		0	1	15	7		
101b	Downing-Lasher	30 and 31	3,352 + 76	Highway.	Trapezoidal	Iron	102		0	1	13	0		
102	Devondorf	30 and 31	3,389 + 67	Farm.	Whipple	Wood	68		4	1	13	0		
103	Sprakers	31 and 32	3,412 + 19	Highway.	Whipple	Wood	71		4	1	13	0		
104	Fort St., Sprakers.	31 and 32	3,420 + 46	Street	Arch	Iron	71		0	1	13	10		
105	Van Eyck	31 and 32	3,441 + 31	Farm.	Whipple	Wood	72		10	1	12	0		
106	Kelly Sprakers	31 and 32	3,463 + 51	Farm.	Whipple	Wood	70		0	1	11	11		
107	Van Alstyne, A.	31 and 32	3,502 + 94	Farm.	Whipple	Wood	70		4	1	12	0		
108	Van Alstyne, L.	31 and 32	3,544 + 81	Farm.	Whipple	Wood	71		0	1	12	0		
109	Bullock	31 and 32	3,568 + 71	Farm.	Whipple	Wood	78		0	1	12	0		
110	Church St.	31 and 32	3,580 + 62	Street	Lift	Iron	94		8	1	19	8	2	6
110a	Private	31 and 32	3,597 + 96	Foot	Suspension.	Wood	78		0				1	6
111	Allen	31 and 32	3,616 + 56	Farm.	Whipple	Wood	70		0	1	12	0		0
112	Wagner	31 and 32	3,653 + 68	Farm.	Whipple	Wood	70		0	1	12	0		
113	Nellis	31 and 32	3,723 + 16	Farm.	Whipple	Wood	70		0	1	12	0		
113a	West Shore railroad.	31 and 32	3,732 + 76	Railroad	Trapezoidal	Iron	185		6	2				
114	Morell-Gas house.	32 and 33	3,750 + 14	Street	Trapezoidal	Wood	70		0	1	16	0		
115	Main St., Fort Plain.	32 and 33	3,757 + 84	Street	Lift	Iron	70		6	1	19	0		
115a	Main St., Fort Plain.	32 and 33	3,758 + 08	Foot	Suspension	Iron	145		6				1	5
116	River St., Fort Plain.	32 and 33	3,761 + 56	Street	Lift	Iron	79		6				2	6
117	Clark	32 and 33	3,779 + 26	Farm.	Whipple	Wood	71		9	1	22	0		3
118	Lape	32 and 33	3,802 + 36	Farm.	Whipple	Wood	70		9	1	12	1		
118a	West Shore railroad.	32 and 33	3,816 + 89	Railroad	Trapezoidal	Iron	185		1	2				
119	Smith	32 and 33	3,945 + 76	Farm.	Whipple	Wood	71		0	1	12	0		

[illegible]

\*Distances taken to centers of tow-path abutments.



## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

## TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Eastern Division—(Concluded).														
161	Bridenbecker.....	45 and 46	5,323 + 20	Farm.....	Whipple.....	Wood.....	71	9	1	12	2	1	12	0
162	Thomas.....	45 and 46	5,351 + 56	Farm.....	Whipple.....	Wood.....	71	0	1	12	6	1	12	0
163	Van Buren.....	45 and 46	5,383 + 13	Farm.....	Whipple.....	Wood.....	71	8	1	12	2	1	12	0
164	Sterling's.....	45 and 46	5,403 + 43	Farm.....	Whipple.....	Wood.....	71	7	1	12	2	1	12	0
165	Robinson's.....	45 and 46	5,455 + 53	Farm.....	Whipple.....	Wood.....	70	10	1	12	1	1	12	4
166	Wesley's.....	45 and 46	5,476 + 30	Farm.....	Whipple.....	Wood.....	71	7	1	12	4	1	12	0
167	Huizer.....	45 and 46	5,499 + 07	Farm.....	Whipple.....	Wood.....	72	0	1	13	0	1	12	0
168	Private.....	45 and 46	5,515 + 25	Farm.....	Whipple.....	Wood.....	72	0	1	12	0	1	12	0
168a	4 Mile grocery.....	45 and 46	5,534 + 02	Foot.....	Stringer.....	Wood.....	128	0	1	14	3	1	4	0
169	Austin's.....	45 and 46	5,531 + 52	Highway.....	Whipple.....	Wood.....	72	9	2	29	8	1	14	1
169a	West Shore railroad.....	45 and 46	5,558 + 88	Railroad.....	Lattice.....	Iron.....	180	0	1	14	1	1	12	9
170	Ferguson.....	45 and 46	5,567 + 76	Highway.....	Whipple.....	Wood.....	72	10	1	12	9	1	12	0
171	Eldred.....	45 and 46	5,586 + 98	Farm.....	Whipple.....	Wood.....	72	10	1	12	9	1	12	0
1	Side-cut at Watervliet (1 <sup>st</sup> v <sup>r</sup> ).....	2 and 3	243 + 30	Street.....	Whipplearch.....	Iron.....	45	4	2	11	0	2	5	0
1	Broadway, Watervliet.....	2 and 3	305 + 35	Tow-path.....	Swing.....	Iron.....	45	0	1	11	0	1	11	0
1	Lower Basin, Watervliet.....	2 and 3	306 + 10	Tow-path.....	Swing.....	Iron.....	60	8	1	11	0	1	11	0
1	Upper Basin, Watervliet.....	2 and 3	306 + 10	Tow-path.....	Swing.....	Iron.....	60	8	1	11	0	1	11	0
1	Rocky Rift feeder.....	35 and 36	4,346 + 91	Tow-path.....	Stringer.....	Wood.....	26	7	1	13	0	1	13	0
2	Tow-path entrance.....	35 and 36	4,346 + 91	Highway.....	Whipple.....	Wood.....	28	2	1	11	0	1	11	0
3	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	29	0	1	12	0	1	12	0
4	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	28	1	1	11	6	1	11	6
5	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	27	6	1	11	6	1	11	6
6	.....	35 and 36	4,346 + 91	Farm.....	Stringer.....	Wood.....	29	3	1	12	0	1	12	0
7	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	29	3	1	12	0	1	12	0
8	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	30	2	1	12	0	1	12	0
9	.....	35 and 36	4,346 + 91	Farm.....	Stringer.....	Wood.....	29	10	1	12	3	1	12	3
10	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	28	0	1	11	3	1	11	3
11	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	29	10	1	11	0	1	11	0
11	.....	35 and 36	4,346 + 91	Farm.....	Whipple.....	Wood.....	29	7	1	11	0	1	11	0

[illegible]

\*Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Middle Division—(Continued).														
31	Kirley's.	46 and 47	6,201 + 57	Farm.	Trapezoidal	Wood.	71	3	1	13		2		
32	Murphy.	46 and 47	6,206 + 27	Highway.	Trapezoidal	Wood.	70	8½	1	13		0		
33	Clark's-Utility.	46 and 47	6,335 + 15	Farm.	Trapezoidal	Wood.	71	7	1	13		0		
33a	Mohawk River St. R. R.	46 and 47	6,439 + 89	Street R. R.	Trapezoidal	Iron.	131	4	1	27		0		
34	Stanwix-Westmoreland.	46 and 47	6,440 + 57	Highway.	Wipple arch	Iron.	78	8	1	19		0	2	6
34½	Bridge on Berne	46 and 47	6,457 + 58	Canal.	Trapezoidal	Wood.	40	5	1	14		0		5
35	Greenfield.	46 and 47	6,461 + 03	Highway.	Wipple arch	Iron.	71	11½	1	14		0		
35½	Tow-path.	46 and 47	6,487 + 68	Tow-path	Stringer	Wood.	22	0	1	15		3		
35½	Mohawk feeder.	46 and 47	6,517 + 62	Highway.	Arch.	Stone.	28	0	1	13		0		
35½	Mohawk feeder.	46 and 47	6,517 + 62	Highway.	Stringer	Wood.	22	0	1	16		0		
36	De Puyster St., Rome.	46 and 47	6,518 + 85	Street.	Wipple arch	Iron.	81	11	1	16		10	2	6
36a	N. Y. C. & H. R. R., Rome.	46 and 47	6,526 + 26	Railroad.	Lattice truss	Iron.	89	6	2	28		0		
36b	N. Y. C. & H. R. R., Rome.	46 and 47	6,526 + 26	Railroad.	Howe	Iron.	89	6	2	15		1		
36½	Black River canal.	46 and 47	6,527 + 61	Tow-path	T'blar arch	Iron.	71	11	1	12		6		
37	James St., Rome.	46 and 47	6,531 + 31	Street.	Trapezoidal	Iron.	91	5	2	20		0	2	7
38	Washington St., Rome.	46 and 47	6,538 + 17	Street.	Wipple arch	Iron.	78	11	2	17		9	5	7
39	George St., Rome.	46 and 47	6,545 + 20	Street.	Trapezoidal	Iron.	88	7	1	22		0	6	8
39½	Madison St., Rome.	46 and 47	6,552 + 33	Street.	Trapezoidal	Iron.	78	4	1	21		4	2	5
40	Jay St., Rome.	46 and 47	6,559 + 35	Street.	Bolm'n arch	Iron.	78	0	1	18		6		3
41	Wood creek, Rome.	46 and 47	6,568 + 67	Tow-path	Stringer	Wood.	30	1	1	13		3		
42	Doxtater Ave., Rome.	46 and 47	6,586 + 62	Street.	Trapezoidal	Wood.	111	5½	1	18		0	1	6
42a	R. W. & O. R. R., Rome.	46 and 47	6,601 + 04	Railroad.	Trapezoidal	Iron.	120	4	1	15		5		
43	Charles St., Rome.	46 and 47	6,604 + 90	Street.	Trapezoidal	Wood.	71	0	1	13		0		
44	Brainard's, Rome.	46 and 47	6,606 + 60	Farm.	Trapezoidal	Wood.	70	8½	1	13		0		
45	Armstrong, Rome.	46 and 47	6,758 + 83	Farm.	Trapezoidal	Wood.	71	8	1	13		0		
46	Herrig's.	46 and 47	6,793 + 09	Highway.	Trapezoidal	Wood.	72	0	1	13		0		
46	Sands.	46 and 47	6,834 + 91	Farm.	Trapezoidal	Wood.	72	0	1	13		0		
47	Turtle.	46 and 47	6,878 + 77	Highway.	Trapezoidal	Wood.	71	5	1	13		3		
48	Main St., New London.	46 and 47	6,907 + 23	Street.	Wipple arch	Iron.	89	1	1	19		2	6	0
51	Grove Spring.	46 and 47	6,976 + 36	Highway.	Trapezoidal	Wood.	78	1	1	13		0		
52	Weismantle, private.	46 and 47	6,982 + 44	Foot.	Trapezoidal	Iron.	88	10	1	13		0	1	5

53	Stacy's Basin.....	46	47	7,010 + 86 Highway	Trapezoidal	Wood	741	0	1	13	3	1	5
54	Stacy's Basin, private	46	47	7,020 + 13 Foot	Trapezoidal	Iron	89	4	1	13	0	0	5
55	Happy Valley.....	46	47	7,063 + 16 Highway	Trapezoidal	Wood	41	4	1	13	0	0	5
56	Hedra Lake canal	46	47	7,103 + 04 Tow-path	Trapezoidal	Iron	41	4	1	13	0	0	5
57	Higginsville.....	46	47	7,106 + 31 Highway	Trapezoidal	Iron	73	4	1	13	0	0	5
58	Higginsville, west	46	47	7,127 + 64 Highway	Trapezoidal	Iron	72	7	1	13	0	0	5
59	Dunbartons.....	46	47	7,173 + 02 Highway	Trapezoidal	Wood	71	5	1	13	0	0	5
60	Durkee.....	46	47	7,208 + 50 Highway	Trapezoidal	Wood	71	3	1	13	0	0	5
61	State	46	47	7,239 + 70 Highway	Trapezoidal	Wood	125	10	1	13	0	0	5
62	N. Y. O. & W. R. R.	46	47	7,328 + 75 Foot	Trapezoidal	Iron	168	6	1	13	0	0	5
63	Glass factory, private	46	47	7,340 + 20 Highway	Trapezoidal	Iron	72	1	1	13	0	0	5
64	Durhamville, east.....	46	47	7,353 + 57 Street	Trapezoidal	Wood	70	1	1	13	0	0	5
65	Durhamville, Center St.	46	47	7,365 + 81 Street	Trapezoidal	Wood	71	4	1	13	0	0	5
66	Durhamville, West Main St.	46	47	7,517 + 52 Highway	Trapezoidal	Wood	75	0	1	13	0	0	5
67	Shoalhammer.....	46	47	7,607 + 43 Highway	Trapezoidal	Wood	71	8	1	13	0	0	5
68	Lenox Basin.....	46	47	7,687 + 50 Street	Trapezoidal	Iron	150	0	1	13	0	0	5
69	C. & N. R. R.	46	47	7,687 + 50 Street	Trapezoidal	Iron	86	2	1	13	0	0	5
70	Peterboro St., Canastota	46	47	7,720 + 03 Street	Trapezoidal	Iron	71	8	1	13	0	0	5
71	Beebe's.....	46	47	7,735 + 02 Highway	Trapezoidal	Wood	71	5	1	13	0	0	5
72	Harris & H. R. R.	46	47	7,753 + 53 Farm	Trapezoidal	Wood	122	11	2	13	0	0	5
73	N. Y. W. S. & B. R. R.	46	47	7,761 + 82 Railroad	Trapezoidal	Iron	170	4	2	13	0	0	5
74	Fallens-Lenox.....	46	47	7,779 + 16 Highway	Trapezoidal	Wood	71	4	1	13	0	0	5
75	New Boston.....	46	47	7,823 + 59 Highway	Trapezoidal	Wood	99	2	1	13	0	0	5
76	Canastota.....	46	47	7,881 + 83 Highway	Trapezoidal	Wood	71	0	1	13	0	0	5
77	Canastota.....	46	47	7,963 + 87 Highway	Trapezoidal	Wood	92	11	1	13	0	0	5
78	Canastota.....	46	47	8,026 + 07 Highway	Trapezoidal	Wood	70	0	1	13	0	0	5
79	Canastota.....	46	47	8,079 + 53 Highway	Trapezoidal	Wood	71	2	1	13	0	0	5
80	Canastota.....	46	47	8,142 + 54 Highway	Trapezoidal	Wood	71	2	1	13	0	0	5
81	Canastota.....	46	47	8,203 + 49 Highway	Trapezoidal	Wood	72	0	1	13	0	0	5
82	Canastota.....	46	47	8,362 + 35 Highway	Trapezoidal	Wood	72	0	1	13	0	0	5
83	Canastota.....	46	47	8,378 + 81 Railroad	Trapezoidal	Wood	118	0	1	13	0	0	5
84	Canastota.....	46	47	8,385 + 55 Farm	Trapezoidal	Wood	72	5	1	13	0	0	5
85	Canastota.....	46	47	8,404 + 33 Change	Trapezoidal	Wood	73	9	1	13	0	0	5
86	Canastota.....	46	47	8,433 + 14 Highway	Trapezoidal	Wood	70	10	1	13	0	0	5
87	Canastota.....	46	47	8,518 + 27 H'w'y & change	Trapezoidal	Wood	70	10	1	13	0	0	5
88	Canastota.....	46	47	8,631 + 50 Highway	Trapezoidal	Wood	81	9	1	13	0	0	5
89	Canastota.....	46	47	8,718 + 86 Street	Trapezoidal	Wood	95	6	1	13	0	0	5
90	Canastota.....	46	47	8,754 + 21 Street	Trapezoidal	Iron	103	6	1	13	0	0	5
91	Crouse Ave., Syracuse	48	49	8,777 + 88 Street	Trapezoidal	Iron	79	2	1	13	0	0	5
92	Catharine-Alm'd., Syracuse	48	49	8,783 + 02 Street	Trapezoidal	Iron	96	6	1	13	0	0	5
93	Orange St., Syracuse	49	50	8,797 + 72 Street	Lift	Iron	99	9	1	13	0	0	5
94	State St., Syracuse	49	50	8,802 + 27 Street	Trapezoidal	Iron	97	0	1	13	0	0	5
95	State St., Syracuse	49	50	8,807 + 07 Street	Lift	Iron	73	9	1	13	0	0	5
96	Syracuse Heat & Power Co.	49	50	8,810 + 68 Pipe	Trapezoidal	Iron	145	0	1	13	0	0	5
97	E. Tow-path-Oswego canal	49	50	8,815 + 04 Tow-path	Trapezoidal	Iron	86	6	1	13	0	0	5
98	W. Tow-path-Oswego canal	49	50	8,815 + 04 Tow-path	Trapezoidal	Iron	66	5	1	13	0	0	5

\* Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Middle Division—(Concluded).														
98	Warren St., Syracuse	49 and 50	8,816 + 16	Street	Trapezoidal	Iron	69	4	2	20	0	2	12	0
99	Salina St., Syracuse	49 and 50	8,820 + 09	Street	Hoist	Iron	73	0	1	44	0	2	8	0
100	Clinton St., Syracuse	49 and 50	8,823 + 50	Street	Hoist	Iron	76	6	1	22	0	2	6	0
101	Franklin St., Syracuse	49 and 50	8,828 + 53	Foot	Trapezoidal	Iron	78	5	1	7	5	1	9	1
102	R. W. & O. R. R., Syracuse	49 and 50	8,828 + 09	Railroad	Swing	Iron	59	2	1	22	0	2	5	6
103	West St., Syracuse	49 and 50	8,838 + 08	Street	Hoist	Iron	63	4	1	16	0	2	6	0
103a	Railroad, Syracuse	49 and 50	8,807 + 85	Street	Trapezoidal	Iron	138	0	1	22	0	2	6	0
104	Geddes St., Syracuse	49 and 50	8,871 + 19	Street	Trapezoidal	Iron	173	9	2	15	0	2	8	0
104a	N. Y. C. & H. R., Syracuse	49 and 50	8,882 + 80	Railroad	Trapezoidal	Iron	118	4	2	24	0	2	6	3
105	West Genesee St.	49 and 50	8,909 + 96	Street	Lift	Iron	70	10	1	10	2	1	5	7
105a	W. Genesee St.	49 and 50	8,907 + 36	Foot	Trapezoidal	Iron	94	6	1	19	0	1	6	3
106	Bridge St.	49 and 50	8,934 + 33	Street	W'ipple arch	Iron	86	11	1	14	0	1	5	7
107	Solvay railroad.	49 and 50	8,970 + 57	Street & pipe	Plate girder	Iron	80	0	1	21	0	1	14	0
108	Willis Ave.	49 and 50	8,986 + 80	Street	Trapezoidal	Iron	95	0	1	15	0	1	14	0
108a	Solvay	49 and 50	9,008 + 55	Railroad	Trapezoidal	Wood	148	6	1	18	3	1	14	0
109	N. Y. C. & H. R. R.	49 and 50	9,016 + 06	Highway	Trapezoidal	Wood	71	2	1	18	3	1	14	0
109a	Gere's Landing	49 and 50	9,070 + 70	Farm	Trapezoidal	Wood	72	4	1	18	3	1	14	0
110	Gere's farm	50 and 51	9,114 + 96	Highway	W'ipple arch	Iron	70	11	1	18	3	1	14	0
111	Belle Isle	50 and 51	9,162 + 30	Highway	W'ipple arch	Iron	71	5	1	18	3	1	14	0
112	Amboy	50 and 51	9,268 + 78	H w'y & change	Trapezoidal	Wood	71	10	1	12	5	1	16	0
113	Camillus	50 and 51	9,380 + 16	Highway	Trapezoidal	Wood	78	0	1	16	0	1	16	0
114	Newport	50 and 51	9,387 + 00	Railroad	Trapezoidal	Iron	101	8	1	9	0	0	7	6
114a	Empire Cement Co.	50 and 51	9,516 + 00	Street	Trapezoidal	Iron	70	10	1	20	6	2	7	6
115	Memphis, Main St.	50 and 51	9,601 + 85	Highway	Trapezoidal	Wood	71	10	1	15	2	2	7	6
116	Peru	50 and 51	9,651 + 00	Highway	Trapezoidal	Wood	71	9	1	14	3	1	13	2
117	Shanty Point-McIntyre	50 and 51	9,771 + 07	Street	Trapezoidal	Wood	72	5	1	13	2	2	6	4
119	Beaver St., Jordan	50 and 51	9,760 + 22	Street	W'ipple arch	Iron	82	1	1	18	3	1	18	3
120	Main St., Jordan	50 and 51	9,709 + 55	Street	Trapezoidal	Wood	71	9	1	18	3	1	18	3
121	Hamilton St., Jordan	50 and 51	9,865 + 61	Highway	Trapezoidal	Wood	73	9	1	18	1	1	18	1
122	Cold Spring, Jordan	51 and 52	9,865 + 59	Highway	Trapezoidal	Wood	72	8	1	13	3	1	13	3
123	Fountainville-Wallace	51 and 52	9,895 + 59	Highway	Trapezoidal	Wood	72	8	1	13	3	1	13	3

124	Fields-Dill.....	51	and	52	9, 911 + 46 Highway.....	Trapesoidal	Wood.....	72	6	1	18	3	.....
124a	N. Y. W. S. & B. R. R.....	51	and	52	9, 919 + 64 Railroad.....	Girder.....	Iron.....	114	0	2	15	9	.....
126	Putnam's.....	51	and	52	9, 987 + 20 Farm.....	Trapesoidal	Wood.....	72	7	1	12	8	.....
127	Young's.....	51	and	52	10, 009 + 31 Farm.....	Trapesoidal	Wood.....	72	0	1	14	6	.....
127a	Southern Central R. R.....	51	and	52	10, 012 + 64 Railroad.....	Trapesoidal	Iron.....	106	10	1	15	0	.....
128	North St., Weedsport.....	51	and	52	10, 028 + 19 Street.....	Whipple arch	Iron.....	72	6	1	19	4	.....
130	Brutus St., Weedsport.....	51	and	52	10, 057 + 18 Street.....	Whipple arch	Iron.....	76	6	1	18	6	.....
130a	N. Y. W. S. & B. R. R.....	51	and	52	10, 078 + 24 Railroad.....	Trapesoidal	Iron.....	193	5	2	16	0	.....
133	Centerport-Styles.....	51	and	52	10, 144 + 75 Highway.....	Whipple arch	Iron.....	72	3	2	19	6	.....
134	Utica St., Port Byron.....	51	and	52	10, 220 + 51 Street.....	Whipple arch	Iron.....	99	10	1	19	2	.....
135	Main St., Port Byron.....	51	and	52	10, 226 + 84 Street.....	Whipple arch	Iron.....	75	21	1	19	5	.....
136	River St., Port Byron.....	51	and	52	10, 244 + 43 Street.....	Whipple arch	Iron.....	71	11	1	19	3	.....
137	Canal St., Port Byron.....	51	and	52	10, 249 + 59 Street.....	Whipple arch	Iron.....	71	11	1	19	3	.....
138	Houghtaling's.....	52	and	53	10, 302 + 45 Highway.....	Whipple arch	Iron.....	72	0	1	19	2	.....
139	McLeod's.....	52	and	53	10, 404 + 14 Highway.....	Whipple arch	Iron.....	71	8	1	19	2	.....
140	Bucklin's.....	52	and	53	10, 416 + 51 Farm.....	Trapesoidal	Wood.....	71	11	1	19	1	.....
141	Salt St., Montezuma.....	52	and	53	10, 468 + 76 Highway.....	Whipple arch	Iron.....	72	2	1	12	8	.....
142	Cayuga St., Montezuma.....	52	and	53	10, 471 + 42 Foot.....	Tubular t'd	Iron.....	80	1	1	12	3	.....
143	Cayuga-Seneca canal.....	52	and	53	10, 473 + 00 Change.....	Tubular t'd	Wood.....	72	3	1	17	2	.....
144	Clark St., Montezuma.....	52	and	53	10, 489 + 11 Street.....	Whipple arch	Iron.....	72	3	1	17	2	.....
145	May's Point.....	52	and	53	10, 634 + 79 H'w'y & change	Whipple arch	Iron.....	100	0	1	19	2	.....

## Western Division.

1	Wayne county line.....	52	and	53	10, 741 + 20 Highway.....	Whipple.....	Wood.....	71	4	1	13	2	.....
2	Pt. Lock, Meadville.....	52	and	53	10, 829 + 83 Highway.....	Whipple arch	Iron.....	71	8	1	13	6	.....
3	Wadgriff's.....	52	and	53	10, 853 + 06 Highway.....	Whipple arch	Iron.....	72	7	1	15	8	.....
3a	W. S. & B. R. R.....	52	and	53	10, 870 + 00 Railroad.....	Pratt.....	Iron.....	158	0	2	14	9	.....
3b	N. Y. C. & H. R. R.....	52	and	53	10, 878 + 92 Railroad.....	Lattice.....	Iron.....	100	0	4	21	0	.....
4	Glasgow St., Clyde.....	52	and	53	11, 082 + 33 Street.....	Lift.....	Iron.....	78	0	1	16	4	.....
5	Sedgman's.....	52	and	53	11, 087 + 17 Street.....	Whipple arch	Iron.....	79	0	1	11	2	.....
6	Parker's.....	53	and	54	11, 157 + 60 Farm.....	Whipple arch	Wood.....	71	0	1	16	0	.....
7	Long.....	53	and	54	11, 237 + 18 Farm.....	Whipple arch	Wood.....	71	9	1	16	0	.....
8	Lock Berlin.....	53	and	54	11, 257 + 84 Farm.....	Whipple arch	Wood.....	70	9	1	16	0	.....
9	Gorton's.....	53	and	54	11, 326 + 60 Highway.....	Lattice.....	Iron.....	71	2	1	12	2	.....
10	Gretman's.....	54	and	55	11, 356 + 60 Highway.....	Whipple arch	Iron.....	71	4	1	15	7	.....
11	Klaus.....	54	and	55	11, 360 + 97 Farm.....	Whipple.....	Wood.....	73	4	1	15	4	.....
12	Richmond's.....	54	and	55	11, 397 + 76 Highway.....	Whipple.....	Wood.....	73	4	1	13	4	.....
13	Crowe's.....	54	and	55	11, 416 + 24 Highway.....	Lattice.....	Iron.....	73	2	1	14	4	.....
14	Geneva St., Lyons.....	54	and	55	11, 439 + 41 Street.....	Whipple arch	Iron.....	84	8	1	16	6	.....
15	Geneva St., Lyons.....	54	and	55	11, 477 + 41 Street.....	Whipple arch	Iron.....	84	8	1	16	6	.....
16	Watkins St., Lyons.....	54	and	55	11, 480 + 62 Street.....	Whipple arch	Iron.....	99	3	1	17	10	.....
17	Watkins St., Lyons.....	54	and	55	11, 486 + 37 Street.....	Whipple arch	Iron.....	86	3	1	16	6	.....
18	Leach's.....	55	and	56	11, 486 + 16 Highway.....	Whipple arch	Iron.....	71	8	1	14	2	.....
19	Abandoned.....	55	and	56	11, 578 + 78 Highway.....	Whipple arch	Iron.....	81	4	1	14	7	.....
20	Part's.....	55	and	56	11, 634 + 06 Highway.....	Lattice.....	Iron.....	70	10	1	14	8	.....
21a	Mosher's.....	56	and	57	11, 683 + 60 Railroad.....	Lattice.....	Iron.....	150	9	4	15	3	.....
21b	N. Y. C. & H. R. R.....	56	and	57	11, 683 + 60 Railroad.....	Lattice.....	Iron.....	150	9	4	15	3	.....
22	Burleigh's.....	56	and	57	11, 691 + 56 Change.....	Bowstring.....	Iron.....	71	3	1	10	5	.....

\* Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Western Division—(Continued).														
22a	W. S. & B. R. R.	56 and	57	11, 745 + 58 Railroad	Pratt	Iron.	127		2	15		9		
23	Lyons St., Newark.	57 and	58	11, 757 + 10 Street	Whipple arch	Iron.	98		1	16				
23a	Northern Central R. R.	59 and	60	11, 778 + 38 Railroad	Pratt	Iron.	110		1	15		1	4	2
24	Charles St., Newark.	59 and	60	11, 792 + 57 Street	Whipple arch	Iron.	73		1	17		0		
25	Maine St., Newark.	59 and	60	11, 799 + 70 Street	Plate girder	Iron.	81		1	28		2	7	2
26	Allerton s.	59 and	60	11, 860 + 34 Highway	Whipple arch	Iron.	70		1	14		6		
27	Peek's s.	59 and	60	11, 891 + 79 Highway	Whipple arch	Iron.	70		1	14		0		
28	Sweezy's s.	59 and	60	11, 928 + 24 Highway	Whipple	Wood	72		1	13		4		
29	Palmer's s.	59 and	60	11, 951 + 90 Highway	Whipple	Wood	71		1	14		10		
30	Port Gibson	59 and	60	11, 979 + 56 Highway	Whipple arch	Iron.	96		1	16		7		
31	Galloway's s.	59 and	60	12, 114 + 72 Highway	Lattice	Iron.	71		1	14		8		
31a	Kent St., Palmyra.	59 and	60	12, 211 + 41 Street	Whipple	Iron.	89		1	15		7		
32	Railroad Ave., Palmyra.	59 and	60	12, 233 + 21 Street	Whipple arch	Iron.	94		1	15		5		
33	Market St., Palmyra.	59 and	60	12, 250 + 90 Street	Whipple arch	Iron.	80		1	16		1	4	4
34	Church St., Palmyra.	59 and	60	12, 261 + 55 Street	Whipple arch	Iron.	80		1	17		5		8
35	Sexton	59 and	60	12, 297 + 89 Change	Pipe arch	Iron.	71		4	12		0		
36	Crandall's s.	59 and	60	12, 327 + 40 Highway	Whipple	Wood	71		6	11		5		
37	Clark's s.	59 and	60	12, 347 + 32 Highway	Whipple	Wood	72		5	13		2		
38	White's s.	59 and	60	12, 392 + 08 Highway	Whipple arch	Iron.	70		4	10		1		
39	Gallup's s.	60 and	61	12, 428 + 01 H. w. y. & change	Lattice	Iron.	72		5	14		2		
40	Macedon.	61 and	62	12, 458 + 73 Street	Whipple arch	Iron.	71		8	15		1		
41	Trear's s.	61 and	62	12, 512 + 31 Highway	Whipple	Wood	71		1	15		1		
42	Wayneport	61 and	62	12, 625 + 12 Highway	Whipple	Wood	70		5	15		1		
43	Knapp's s.	61 and	62	12, 748 + 61 Highway	Whipple	Wood	72		1	14		5		
44	Cobb's s.	61 and	62	12, 826 + 84 Highway	Whipple	Wood	72		1	16		6		
45	Parker St., Fairport.	61 and	62	12, 860 + 98 Street	Lattice	Iron.	85		1	16		0		
46	Main St., Fairport.	61 and	62	12, 901 + 17 Highway	Plate girder	Iron.	84		11	21		4	5	9
47	Fullam St., Fairport.	61 and	62	12, 902 + 06 Highway	Lift	Iron.	73		3	17		0	5	0
48	Wapping s.	61 and	62	13, 002 + 07 Highway	Whipple	Iron.	83		3	14		9	5	
49	Sage's s.	61 and	62	13, 030 + 07 Highway	Whipple arch	Wood	74		7	14		5		
50	Businella's Basin.	61 and	62	13, 078 + 52 Highway	Whipple arch	Iron.	83		6	17		4	3	11

51	Cartersville	61	and	62	13, 162 + 84 Highway	Whipple	Wood	74	3	1	14	3	.....
51a	N. Y. C. & B. R. (Auburn Branch)	61	and	62	13, 179 + 50 Railroad	Lattice	Iron	104	5	1	14	4	.....
52	Guernsey	61	and	62	13, 196 + 53 Highway	Whipple	Wood	99	4	1	14	4	.....
53	Main St., Pittsford	61	and	62	13, 223 + 15 Street	Whipple arch	Iron	85	11	1	16	11	.....
54	State St., Pittsford	61	and	62	13, 233 + 15 Street	Plate girder	Iron	84	9	2	22	9	.....
54a	N. Y. W. S. & B. R.	61	and	62	13, 246 + 53 Railroad	Whipple arch	Iron	133	3	2	28	3	.....
55	Sutherland's	61	and	62	13, 265 + 53 Railroad	Whipple arch	Iron	73	9	1	14	13	.....
56	Week's	61	and	62	13, 343 + 62 Highway	Whipple	Wood	75	3	1	12	4	.....
57	Week's	62	and	63	13, 383 + 10 Highway	Whipple	Wood	73	3	1	12	4	.....
58	Billinghurst's	62	and	63	13, 408 + 10 Highway	Whipple arch	Iron	73	3	1	14	0	.....
58a	Rochester & Eastern Rapid Ry.	62	and	63	13, 425 + 44 Railroad	Pratt truss	Iron	115	6	1	14	0	.....
59	Donnelly's	62	and	63	13, 450 + 25 Highway	Whipple	Wood	73	3	1	14	7	.....
60	Drake's	62	and	63	13, 487 + 40 Highway	Whipple	Wood	71	6	1	14	4	.....
61	South Ave., Brighton	63	and	64	13, 522 + 03 Street	Lift	Iron	91	6	1	19	8	.....
62	Culver St., Rochester	65	and	66	13, 574 + 54 Street	Lattice	Iron	105	4	0	17	6	.....
63	Monroe St., Rochester	65	and	66	13, 604 + 99 Street	Web lattice	Iron	118	0	2	22	5	.....
64	Goodman St., Rochester	66	and	67	13, 627 + 07 Street	Whipple arch	Iron	90	9	1	15	6	.....
65	Meigs St., Rochester	66	and	67	13, 634 + 72 Street	Pipe arch	Iron	90	9	1	17	1	.....
66	Averill Ave., Rochester	66	and	67	13, 646 + 52 Street	Whipple arch	Iron	84	8	1	16	1	.....
67	Alexander St., Rochester	66	and	67	13, 651 + 55 Street	Whipple arch	Iron	73	3	1	16	0	.....
68	So. Clinton St., Rochester	66	and	67	13, 663 + 05 Street	Plate girder	Iron	93	0	1	36	0	.....
69	South Ave., Rochester	66	and	67	13, 671 + 66 Street	Lattice	Iron	113	0	2	16	0	.....
70	Griffith St., Rochester	66	and	67	13, 672 + 73 Street	Lattice	Iron	104	10	1	19	5	.....
71	Sweeney's	66	and	67	13, 680 + 98 Change	Bowstring	Iron	135	7	1	11	39	.....
72	Court St., Rochester	66	and	67	13, 687 + 64 Street	Plate girder	Iron	72	8	1	39	0	.....
73	Aqueduct St., Rochester	66	and	67	13, 698 + 26 B g to c y w r's	Lattice	Iron	138	7	1	8	0	.....
74	Exchange St., Rochester	66	and	67	13, 699 + 76 Foot	Bowstring	Iron	127	8	1	47	5	.....
75	Exchange St., Rochester	66	and	67	13, 700 + 29 Street	Lift	Iron	88	6	1	33	6	.....
76	Plymouth Ave., Rochester	66	and	67	13, 704 + 66 Street	Lift	Iron	94	0	1	37	0	.....
77	Fitzhugh St., Rochester	66	and	67	13, 708 + 85 Street	Lift	Iron	92	0	1	37	0	.....
78	Washington St., Rochester	66	and	67	13, 712 + 86 Street	Bollman	Iron	85	2	1	19	4	.....
79	Washington St., Rochester	66	and	67	13, 718 + 83 Street	Lift	Iron	78	4	1	20	7	.....
80	Caladonia St., Rochester	66	and	67	13, 721 + 12 Street	Lift	Iron	112	4	1	40	1	.....
81	West Ave., Rochester	66	and	67	13, 724 + 87 Street	Lattice	Iron	94	0	1	17	8	.....
82	Ford St., Rochester	66	and	67	13, 731 + 14 Tow-path	Pipe	Iron	90	6	1	14	0	.....
83a	Genesee Valley canal, Rochester	66	and	67	13, 734 + 65 Railroad	Lattice	Iron	136	3	1	13	0	.....
84	B. & P. R. R.	66	and	67	13, 736 + 53 Street	Lattice	Iron	95	9	5	19	0	.....
85a	N. Y. C. & H. R. R. Rochester	66	and	67	13, 736 + 51 Railroad	Lattice	Iron	68	5	5	13	0	.....
86	Allen St., Rochester	66	and	67	13, 743 + 31 Street	Lift	Iron	84	4	1	16	4	.....
87	Brown St., Rochester	66	and	67	13, 743 + 31 Street	Lift	Iron	78	8	1	17	3	.....
88	Jay St., Rochester	66	and	67	13, 750 + 41 Street	Lift	Iron	125	5	1	18	4	.....
89	Smith St., Rochester	66	and	67	13, 757 + 00 Street	Whipple arch	Iron	84	4	1	16	4	.....
90	N. Y. C. & H. R. R. Falls Br	66	and	67	13, 771 + 86 Railroad	Lattice	Iron	78	8	1	17	3	.....
91	Lvell Ave., Rochester	66	and	67	13, 778 + 28 Street	Lift	Iron	100	7	1	17	0	.....
92	Lvell Ave., Rochester	66	and	67	13, 778 + 28 Street	Lift	Iron	76	2	1	17	0	.....
93	Emerson St., Rochester	66	and	67	13, 816 + 02 Street	Plate girder	Iron	118	3	1	15	22	.....
94	Emerson St., Rochester	66	and	67	13, 816 + 02 Street	Lift	Iron	118	3	1	15	22	.....
95	Lexington Ave., Rochester	66	and	67	13, 844 + 13 Street	Lift	Iron	69	7	1	22	4	.....

\* Distances taken to centers of row-path abutments.



## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Western Division—(Continued.)														
860	N. Y. C. & H. R. R.	66 and 67	13, 847 + 37	Railroad.	Lattice.	Iron.	128	11	1	14	6	6		
861	B. R. & P. R. R.	66 and 67	13, 852 + 37	Railroad.	Pratt.	Iron.	104	2	1	14	9	6		
862	King St.	66 and 67	13, 854 + 25	Change.	Bowstring.	Iron.	82	4	1	10	2	6		
863	Scot's	66 and 67	13, 887 + 23	Highway.	Whipple.	Wood.	81	8	1	13	2	6		
864	Four Mile grocery	66 and 67	13, 915 + 63	Highway.	Whipple.	Wood.	81	0	1	14	5	6		
865	Spiel's	66 and 67	14, 019 + 69	Highway.	Whipple.	Iron.	80	7	1	14	6	6		
866	Six Mile grocery	66 and 67	14, 034 + 06	Highway.	Whipple.	Iron.	91	2	1	16	3	6		
867	Douglas	66 and 67	14, 066 + 51	Farm.	Whipple.	Wood.	79	9	1	12	7	7		
868	Finley's	66 and 67	14, 103 + 06	Highway.	Whipple.	Wood.	82	1	1	15	3	6		
869	So. Greece	66 and 67	14, 117 + 48	Highway.	Whipple arch	Iron.	91	0	1	17	0	9		
870	Cromwell's	66 and 67	14, 175 + 96	Highway.	Whipple arch	Iron.	80	8	1	14	9	9		
871	Hiscock's	66 and 67	14, 232 + 28	Highway.	Whipple arch	Iron.	80	5	1	14	1	6		
872	Norman's	66 and 67	14, 280 + 21	Highway.	Whipple.	Wood.	81	10	1	12	8	6		
873	Union St., Spencerport.	66 and 67	14, 309 + 14	Street.	Whipple arch	Iron.	85	3	1	16	4	2		
874	Amity St., Spencerport.	66 and 67	14, 320 + 00	Street.	Whipple arch	Iron.	94	3	1	14	1	6		
875	Webster east.	66 and 67	14, 373 + 77	Highway.	Whipple arch	Iron.	82	8	1	16	1	6		
876	Webster west.	66 and 67	14, 391 + 96	Highway.	Whipple arch	Iron.	82	7	1	16	1	6		
877	Crissey's	66 and 67	14, 446 + 26	Highway.	Whipple.	Iron.	80	9	1	15	7	6		
878	Adams Basin.	66 and 67	14, 464 + 11	Highway.	Whipple arch	Iron.	81	1	1	16	10	5	0	
879	Doty's	66 and 67	14, 520 + 65	Highway.	Whipple arch	Iron.	82	1	1	14	7	6		
880	Brookway's	66 and 67	14, 576 + 42	Highway.	Whipple arch	Iron.	81	9	1	15	7	6		
881	Cooley's Basin.	66 and 67	14, 583 + 18	Highway.	Whipple arch	Iron.	81	6	1	15	10	6		
882	Mechanic St., Brockport.	66 and 67	14, 704 + 25	Street.	Whipple arch	Iron.	84	6	1	16	8	4	9	
883	Main St., Brockport.	66 and 67	14, 713 + 18	Street.	Lattice.	Iron.	80	9	1	20	6	2	8	
884	Smith St., Brockport.	66 and 67	14, 728 + 71	Street.	Whipple arch	Iron.	84	4	1	13	7	4	8	
885	Danforth's	66 and 67	14, 782 + 03	Highway.	Whipple arch	Iron.	86	4	1	13	11	6		
886	Miner's	66 and 67	14, 865 + 92	Highway.	Lattice.	Iron.	86	0	1	15	7	6		
887	County line.	66 and 67	14, 880 + 53	Highway.	Whipple arch	Iron.	86	8	1	11	10	6		
888	Orr's	66 and 67	14, 928 + 28	Highway.	Bowstring.	Iron.	86	3	1	12	9	4		
889	Frisbie's (old canal)	66 and 67	Off line of c/l	Highway.	Whipple arch	Iron.	80	2	1	10	6	2		
890	Canal St., Holly	66 and 67	14, 953 + 08	Street.	Whipple arch	Iron.	87	2	1	15	1	6		



TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
 TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
 TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuities stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
Western Division—(Continued).														
161	Pine and Lock Sta., Lock- port.	69 and 70	16, 917 + 70 Street.	Arch.	Iron.		162	8	1	40	0	2	12	8
162	Cottage St., Lockport.	71 and 72	16, 923 + 72 Street.	Arch.	Iron.		84	4	1	21	0	2	12	7
163	Main St., Lockport.	71 and 72	16, 926 + 31 Street.	Arch.	Iron.		84	4	1	24	7	2	10	5
164	Tranait St., Lockport.	71 and 72	16, 932 + 30 Street.	Whipple arch	Iron.		113	2	1	17	3	4	10	4
164a	Prospect St., Lockport.	71 and 72	16, 951 + 91 Street.	Lattice.	Iron.		88	0	1	16	3	2	4	9
165	Hitchins, City line.	71 and 72	16, 995 + 18 Highway.	Whipple arch	Iron.		74	0	1	13	7	0		
166a	Hencox.	71 and 72	17, 082 + 50 Highway.	Whipple arch	Wood.		99	2	1	12	0			
166b	Hencox.	71 and 72	17, 082 + 50 Highway.	Whipple.	Wood.		37	6	1	13	2			
167a	Hawley's.	71 and 72	17, 130 + 06 Highway.	Whipple.	Wood.		98	1	1	13	2			
167b	Hawley's.	71 and 72	17, 130 + 66 Highway.	Whipple trap	Iron.		36	1	1	13	2			
168a	Sulphur Springs, G. L.	71 and 72	17, 194 + 11 Highway.	Whipple.	Wood.		46	0	1	9	7			
168b	Sulphur Springs, G. L.	71 and 72	17, 194 + 11 Highway.	Whipple.	Wood.		33	10	1	9	7			
168c	Sulphur Springs, G. L.	71 and 72	17, 194 + 11 Highway.	Whipple.	Wood.		36	11	1	9	7			
169a	Pendleton.	71 and 72	17, 273 + 60 Highway.	Whipple pipe	Iron.		102	6	1	11	10			
169b	Pendleton.	71 and 72	17, 273 + 75 Change.	Trapezoidal.	Iron.		102	6	1	7	11			
170	Old canal, Pendleton.	71 and 72	Off line of c'l Highway.	Pipe.	Iron.		35	0	1	14	10			
171	Tonawanda creek.	71 and 72	17, 276 + 50 Highway.	Whipple.	Wood.		1-60, 2-61, 3-59	8 } 9 } 10 }	1	9	10			
172	Kangome creek.	71 and 72	17, 368 + 09 Tow-path.	Whipple.	Wood.		33	2	1	12	4			
172a	Black creek.	71 and 72	17, 376 + 50 Tow-path.	Stringer.	Wood.		30	0	1	18	0			
173	New Home.	71 and 72	17, 426 + 48 Highway.	Trapezoidal.	Iron.		200	0	1	15	0			
174a	Pickard's.	71 and 72	17, 508 + 43 Highway.	Pratt.	Iron.		127	0	1	16	1			
174b	Pickard's.	71 and 72	17, 508 + 43 Highway.	Pratt.	Iron.		81	9	1	16	7			
175	Bush's.	71 and 72	17, 678 + 47 Highway.	Rowstring.	Iron.		170	3	1	16	4			
175a	Errie R. R.	71 and 72	17, 871 + 40 Railroad.	Pratt.	Iron.		108	10	1	15	4			
175b	N. Y. C. & H. E. R., Tona- wanda.	71 and 72	17, 874 + 81 Railroad.	Plate girder.	Iron.		98	0	1	14	0			

175c Delaware Ave., Tonawanda	71 and	72 17, 885 + 93 Street	Lattice.	Iron.	131	2	1	19	9	2	4
176 Ellicott creek, Tonawanda.	71 and	72 17, 885 + 53 Street	Pipe arch.	Iron.	49	0	1	11	1		
176a N. Y. C. & H. R. R., Tonawanda.	71										
177 Main St., Tonawanda.	71 and	72 17, 892 + 19 Railroad	Lattice.	Iron.	91	8	1	14	0		
178 River lock slip, Tonawda.	71 and	72 17, 892 + 61 Street	Lattice.	Iron.	86	5	1	26	0		
179 Seymour St., Tonawanda.	71 and	72 17, 896 + 22 Street	W'ipple arch	Iron.	52	1	1	15	7	9	4
180 Bouck St., Tonawanda.	71 and	72 17, 899 + 42 Street	W'ipple arch	Iron.	82	11	1	15	6	2	0
181 Gibson St., Tonawanda.	71 and	72 17, 912 + 98 Street	Bollman	Iron.	83	2	1	16	2	2	5
182 Grand Island ferry.	71 and	72 17, 912 + 98 Street	W'ipple arch	Iron.	92	8	1	16	2	2	0
182a Buck's	71 and	72 17, 947 + 53 Change	Pipe arch	Iron.	92	11	1	13	10		
183 Three Mile	71 and	72 17, 947 + 69 H' w'y & change	W'ipple arch	Iron.	94	11	1	13	10		
184 Cherry's	71 and	72 17, 952 + 36 Pipe line	Trapezoidal	Iron.	160	0	1	15	0	5	0
185 Linberg's	71 and	72 18, 035 + 18 Highway	Whipple	Wood	84	0	1	12	8		
186 Scott's ferry.	71 and	72 18, 089 + 85 Highway	Whipple	Wood	83	6	1	12	4		
187 Germania Park, private.	71 and	72 18, 135 + 44 Highway	W'ipple arch	Iron.	81	11	1	12	4		
188 Erie R. R.	71 and	72 18, 190 + 36 Highway	W'ipple arch	Iron.	80	0	1	14	2		
189 Pratt's Black Rock	71 and	72 18, 238 + 90 Foot	Lattice.	Iron.	115	6	1	16	1	7	4
190 Pratt's slip-Black Rock	71 and	72 18, 283 + 67 Railroad	Pratt	Iron.	144	4	1	16	1		
191 Hartel Ave., Black Rock	71 and	72 18, 284 + 40 H' w'y & change	Whipple	Iron.	92	11	1	14	11		
192 Austin St., Black Rock	71 and	72 18, 287 + 98 Tow-path	Lift	Iron.	25	0	1	9	4		
193 Hamilton St., Black Rock	71 and	72 18, 296 + 01 Street	W'ipple arch	Iron.	103	8	1	13	8		
194 Hamilton St., Black Rock	71 and	72 18, 306 + 25 Street	Lattice.	Iron.	120	6	1	16	8		
195 Amhurst St., Black Rock	W. of No. 72	72 18, 313 + 62 Street	Lattice.	Iron.	120	6	1	18	8	2	6
196 Mill St., Black Rock	W. of No. 72	72 18, 320 + 49 Street	W'ipple arch	Iron.	116	4	1	14	10	3	4
197 Grand Trunk R. R.	W. of No. 72	72 18, 325 + 92 Street	Lattice.	Iron.	116	3	1	19	0	2	4
198 Scotchman's creek.	W. of No. 72	72 18, 330 + 30 Railroad	Swing	Iron.	213	5	1	18	0	2	4
199 Ferry St., Buffalo	W. of No. 72	72 18, 337 + 72 Tow-path	Swing	Iron.	39	2	1	16	0		
200 N. Y. C. & H. R. R., Buffalo	W. of No. 72	72 18, 363 + 77 Street	Lattice.	Iron.	129	10	1	15	9	2	5
201 N. Y. C. & H. R. R., Buffalo	W. of No. 72	72 18, 363 + 77 Street	Swing	Iron.	226	0	2	26	5	10	
202 Porter Ave., Buffalo	W. of No. 72	72 18, 442 + 73 Railroad	Pratt	Iron.	223	0	2	26	5		
203 Jersey St., Buffalo	W. of No. 72	72 18, 452 + 06 Street	Arch.	Iron.	190	6	1	17	2	25	3
204 Hudson St., Buffalo	W. of No. 72	72 18, 463 + 08 Street	Lattice.	Iron.	178	9	1	16	2		
205 Gorga St., Buffalo	W. of No. 72	72 18, 478 + 09 Change	Lattice.	Iron.	178	9	1	16	2		
206 P. & R. R., Buffalo	W. of No. 72	72 18, 506 + 82 Street	W'ipple arch	Iron.	176	4	1	13	6		
207 Ship No. 3, Buffalo	W. of No. 72	72 18, 509 + 86 Railroad	Lattice.	Iron.	69	11	2	12	8		
208 N. Y. C. & H. R. R., Buffalo	W. of No. 72	72 18, 512 + 80 Tow-path	Plate girder	Iron.	71	10	2	13	0		
209 Genesee St., Buffalo	W. of No. 72	72 18, 520 + 02 Railroad	Pratt	Iron.	225	10	2	13	10		
210 River St., slip No. 2, Buffalo	W. of No. 72	72 18, 522 + 10 Street	Lattice.	Iron.	169	5	1	17	1	6	0
211 N. Y. C. & H. R. R., slip No. 2	W. of No. 72	72 18, 524 + 75 Street	Lattice.	Iron.	87	8	2	16	8	0	2
212 N. Y. C. & H. R. R., slip No. 2	W. of No. 72	72 18, 524 + 75 Railroad	Lattice.	Iron.	98	7	2	15	0		
213 Ship No. 2, Buffalo	W. of No. 72	72 18, 524 + 75 Railroad	Lattice.	Iron.	94	7	2	14	7		
214 River St., slip No. 1	W. of No. 72	72 18, 524 + 75 Tow-path	W'ipple arch	Iron.	80	2	1	14	7		
215 C. T. R. R., slip No. 1	W. of No. 72	72 18, 531 + 10 Highway	W'ipple arch	Iron.	87	11	1	12	18		
216 N. Y. C. & H. R. R., slip No. 1	W. of No. 72	72 18, 531 + 10 Railroad	Lattice.	Iron.	72	4	2	16	8	6	0
217 N. Y. C. & H. R. R., slip No. 1	W. of No. 72	72 18, 531 + 10 Railroad	Plate girder	Iron.	101	5	2	27	0		
218 Ship No. 1, Buffalo	W. of No. 72	72 18, 531 + 10 Tow-path	Boasting.	Iron.	80	13	1	14	0		
219 Evans' St., Buffalo.	W. of No. 72	72 18, 537 + 21 Street	Plate girder	Iron.	88	6	2	27	4	17	6
220a Evans' St., Buffalo.	W. of No. 72	72 18, 541 + 90 Street	Lattice.	Iron.	93	0	2	27	4	5	5

\*Distances taken to centers of tow-path abutments.

\*Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF BRIDGES—(Concluded).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
<i>Western Division—(Concluded).</i>														
204	Commercial St., Buffalo.....	W. of No. 72	18,547 + 85	Street.....	Lattice.....	Iron.....	88	7	2	12	10	2	6	7
205	Lake St., Commercial slip..	W. of No. 72	18,549 + 32	Street.....	Lattice.....	Iron.....	85	0	2	14	7	2	5	10
205a	D. L. & W. R. R., Commer- cial slip.....	W. of No. 72	18,552 + 37	Railroad.....	Pratt.....	Iron.....	93	2	1	14	2	.....	.....	.....
206	Prime St., Commercial slip	W. of No. 72	18,552 + 69	Street.....	Lattice.....	Iron.....	82	2	1	19	7	1	5	10
207	Lloyd St.....	W. of No. 72	18,550 + 20	Street.....	Lattice.....	Iron.....	87	4	2	12	7	2	6	10

\*Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF CULVERTS.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.		
						LENGTH.		SPAN.		HEIGHT.				
						Feet.		In.		Feet.			In.	
<i>Eastern Division.</i>														
1	Patroon creek.	1 and 2	21 + 77 Arch.		3	134	0	10	0	4	0	8 Stone.		
2	North Albany.	1 and 2	51 + 13 Arch. diving.		1	106	5	6	0	6	0	0 Stone.		
3	Colonie.	2 and 3	91 + 88 Arch. diving.		1	137	0	2	0	5	0	6 Stone.		
4	Colonie.	2 and 3	130 + 10 Arch. diving.		1	136	0	6	0	2	0	2 Stone.		
5	Menands.	2 and 3	157 + 34 Box, diving.		1	130	0	6	0	4	0	6 Stone.		
6	Richardson.	2 and 3	175 + 27 Arch. diving.		1	130	0	6	0	5	0	5 Stone.		
7	Dunlop.	2 and 3	190 + 75 Box, diving.		1	130	0	15	...	4	0	4 Stone.		
8	Foundry.	2 and 3	248 + 15 Box, diving.		2	142	0	0	0	4	0	4 Stone.		
9	Dry river.	2 and 3	272 + 03 Arch.		2	105	0	9	0	4	0	4 Stone.		
10	Mohawk Basin.	2 and 3	328 + 48 Box, diving.		1	130	0	6	0	3	0	3 Stone.		
11	Oothout.	3 and 4	353 + 46 Arch. diving.		1	162	0	6	0	13	0	0 Stone.		
12	Lansing.	6 and 7	389 + 88 Arch.		1	198	10	12	0	6	0	9 Stone.		
13	Hart.	9 and 10	426 + 50 Arch.		1	101	3	8	4	3	0	8 Stone.		
14	(Abandoned).	13 and 14	460 + 44 Arch.		1	162	0	4	0	4	0	4 Stone.		
15	Taylor.	17 and 18	508 + 75 Arch. diving.		1	205	6	8	4	7	0	0 Stone.		
16	Wheeler.	18 and 19	535 + 86 Arch.		1	182	5	3	5	3	0	5 Stone.		
17	Shurman.	18 and 19	640 + 78 Box, diving.		1	159	8	8	0	9	0	8 Stone.		
18	Lane.	18 and 19	682 + 23 Arch.		1	150	0	6	0	3	0	3 Stone.		
19	Tow-path, bridge No. 39.	18 and 19	836 + 09 Arch.		1	76	1	1	9	1	1	7 Stone.		
19a	McGowan.	18 and 19	855 + 04 Box, diving.		3	127	0	2	5	2	0	2 Stone.		
20	Fraser.	18 and 19	858 + 00 Arch. diving.		1	122	0	3	5	4	0	4 Stone.		
21	Stoney creek.	19 and 20	947 + 37 Box, diving.		1	165	0	10	6	10	0	9 Stone.		
22	Vandeboegart, for feeder.	22 and 23	1,028 + 33 Arch.		1	222	0	28	0	14	0	14 Stone.		
23	Simonskill.	22 and 23	1,310 + 57 Arch.		1	220	0	17	0	6	0	6 Stone.		
24		22 and 23	1,442 + 23 Arch.		1	165	0	13	0	2	0	2 Stone.		
25		22 and 23	1,490 + 90 Arch. diving.		1	178	0	14	0	7	0	7 Stone.		
26		22 and 23	1,537 + 57 Arch.		1	178	0	14	0	7	0	7 Stone.		

\*Distances taken to centers of culverts.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF CULVERTS—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Plan.	Number of openings.	DIMENSIONS OF OPENING.						Material.		
						LENGTH.		SPAN.		HEIGHT.				
						Feet.		In.		Feet.			In.	
						Feet.	In.	Feet.	In.	Feet.	In.		Feet.	In.
Eastern Division—(Continued).														
27		22 and 23	1,579 + 95 Arch.		1	125	0	5	6	4		9 Stone.		
28		22 and 23	1,614 + 45 Arch.		1	135	0	12	0	8		6 Stone.		
29		24 and 25	1,722 + 79 Arch.		1	125	0	7	0	5		0 Stone.		
30		24 and 25	1,813 + 30 Arch.		1	162	0	7	0	7		6 Stone.		
31		24 and 25	1,829 + 82 Arch.		1	164	0	11	0	8		6 Stone.		
32		24 and 26	2,017 + 64 Box		1	157	6	2	6	2		10 Stone.		
33		25 and 26	2,039 + 58 Arch.		1	131	0	4	0	4		0 Stone.		
34		25 and 26	2,093 + 20 Box		1	139	5	2	0	1		2 Stone.		
35		25 and 26	2,134 + 19 Arch.		1	136	10	4	0	2		0 Stone.		
36		25 and 26	2,187 + 82 Arch.		1	133	8	10	0	5		6 Stone.		
37		27 and 28	2,363 + 18 Arch.		2	141	10	18	0	8		0 Stone.		
38		27 and 28	2,397 + 30 Arch.		1	135	0	7	0	3		0 Stone.		
39		27 and 28	2,371 + 20 Arch.		1	135	0	4	0	5		0 Stone.		
40	Combined with waste-weir	27 and 28	2,400 + 25 Box		1	222	0	6	0			0 Stone.		
41		27 and 28	2,419 + 30 Arch.		4	135	6	20	0	7		0 Stone.		
42	Chuctenunda creek	27 and 28	2,542 + 25 Arch.		1	141	8	6	0	3		0 Stone.		
43	Putman.	28 and 29	2,595 + 21 Arch.		1	204	8	4	0	3		0 Stone.		
44	Emery's.	28 and 29	2,631 + 57 Round.		1	156	0	4	0	3		0 Iron pipe.		
45	Voorhees.	28 and 29	2,723 + 93 Arch.		2	142	0	10	0	2		0 Stone.		
46	Houck.	30 and 31	2,773 + 24 Arch.		1	182	0	4	0	5		2 Stone.		
47	Schutt's.	30 and 31	2,789 + 25 Arch.		2	136	3	23	3	9		0 Stone.		
48	Auricsville creek	30 and 31	2,863 + 15 Arch.		4	136	3	4	0	2		0 Stone.		
49	Silmsier.	30 and 31	2,808 + 48 Arch.		1	135	0	4	0	2		0 Stone.		
50	Fultonville.	30 and 31	2,941 + 01 Arch.		2	135	0	0	0	3		2 Stone.		
51	Yates.	30 and 31	2,958 + 92 Arch.		1	134	7	9	0	5		0 Stone.		
52	Van Wie.	30 and 31	3,144 + 54 Arch.		1	125	8	4	0	4		0 Stone.		
53	Codington.	30 and 31	3,210 + 61 Arch.		1	123	1	4	0	3		0 Stone.		
54	Devendorf.	30 and 31	3,401 + 04 Arch.		1	130	7	4	0	3		6 Stone.		

[illegible]

\*Distances taken to centers of culverts.

*Middle Division.*

5



TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF CULVERTS—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.
						LENGTH.		SPAN.		HEIGHT.		
						Feet.	In.	Feet.	In.	Feet.	In.	
						Feet.	In.	Feet.	In.	Feet.	In.	
<i>Middle Division—(Continued).</i>												
13	Whitehall creek	46 and 47	6,457 + 04 Box	.....	2	144	6	8	10	3	11	Brick, concrete.
14	.....	46 and 47	6,634 + 00 Composite	.....	.....	138	5	3	0	2	0	Stone.
15	Wood creek	46 and 47	6,693 + 10 Arch	.....	1	137	0	12	0	7	0	Stone.
16	.....	46 and 47	6,749 + 02 Arch	.....	1	159	0	3	0	5	0	Stone.
17	.....	46 and 47	6,773 + 06 Composite	.....	1	140	0	3	0	2	0	Wood.
18	Stony creek	46 and 47	6,814 + 41 Arch	.....	1	135	0	12	0	0	0	Stone.
19	.....	46 and 47	6,855 + 41 Arch	.....	1	140	0	4	0	5	0	Stone.
20	.....	46 and 47	6,880 + 78 Composite	.....	1	135	0	4	0	0	0	Wood.
20½	.....	46 and 47	6,903 + 51 Composite	.....	1	137	0	3	0	2	0	Wood.
21	.....	46 and 47	6,932 + 02 Composite	.....	1	137	0	3	0	4	0	Wood.
22	.....	46 and 47	6,952 + 42 Composite	.....	1	139	0	4	0	4	0	Wood.
23	.....	46 and 47	6,968 + 75 Composite	.....	1	136	0	2	0	4	0	Wood.
24	.....	46 and 47	6,997 + 71 Composite	.....	1	140	0	3	0	2	0	Wood.
25	.....	46 and 47	7,025 + 83 Composite	.....	3	139	6	3	0	3	0	Wood.
26	.....	46 and 47	7,071 + 17 Composite	.....	3	147	2	3	0	3	0	Wood.
27	.....	46 and 47	7,124 + 42 Composite	.....	1	122	0	3	0	3	0	Wood.
28	.....	46 and 47	7,141 + 49 Composite	.....	1	122	0	4	0	2	0	Wood.
29	.....	46 and 47	7,162 + 02 Composite	.....	1	112	0	3	0	3	0	Wood.
30	.....	46 and 47	7,183 + 42 Composite	.....	1	110	0	3	0	3	0	Wood.
31	Potter	46 and 47	7,201 + 17 Composite	.....	1	112	0	3	0	3	0	Wood.
32	.....	46 and 47	7,234 + 01 Composite	.....	2	113	6	3	0	3	0	Wood.
33	.....	46 and 47	7,257 + 07 Composite	.....	2	113	2	3	0	3	0	Wood.
34	.....	46 and 47	7,295 + 50 Arch	.....	1	107	10	4	0	2	0	Stone.
35	.....	46 and 47	7,301 + 89 Arch	.....	1	109	4	4	0	2	0	Stone.
36	Brandy brook	46 and 47	7,317 + 02 Arch	.....	1	148	1	12	0	10	0	Stone.
37	Durhamville	46 and 47	7,348 + 00 Arch	.....	1	175	3	4	0	8	0	Stone.
38	Onesida creek	46 and 47	7,359 + 53 Arch	.....	2	150	2	25	0	14	0	Stone.
39	Lenox Basin	46 and 47	7,564 + 02 Composite	.....	2	112	2	6	0	2	0	Wood.

40	Canastota.....	46 and 47	7,617 + 38 Composite.....	119	0	2	0	3	0	W.ood.
41	Canastota creek.....	46 and 47	7,663 + 44 Arch.....	118	4	8	0	5	0	Stone.
42	.....	46 and 47	7,673 + 56 Composite.....	109	10	3	0	2	0	W.ood.
43	.....	46 and 47	7,735 + 58 Composite.....	108	10	3	0	2	0	W.ood.
44	.....	46 and 47	7,735 + 72 Composite.....	109	10	3	0	3	0	W.ood.
45	Canaseraga.....	46 and 47	7,667 + 63 Composite.....	116	3	8	2	3	4	Stone.
46	.....	46 and 47	7,663 + 68 Arch.....	109	4	5	0	3	0	Stone.
47	.....	46 and 47	8,067 + 96 Arch.....	119	4	5	0	4	0	Stone.
48	.....	46 and 47	8,278 + 96 Arch.....	119	6	3	0	4	0	Stone.
49	.....	46 and 47	8,269 + 93 Arch.....	203	0	3	0	4	0	Stone.
50	.....	46 and 47	8,461 + 74 Arch.....	115	1	4	0	3	0	Stone.
51	.....	46 and 47	8,811 + 31 Arch.....	161	6	20	0	13	0	Stone.
52	.....	46 and 47	8,835 + 15 Arch.....	200	0	1	10	7	0	Stone.
53	.....	46 and 47	8,881 + 04 Arch.....	125	0	3	0	3	0	Stone.
54	.....	46 and 47	8,946 + 87 Arch.....	175	6	3	0	3	0	Stone.
55	.....	46 and 47	8,980 + 30 Arch.....	124	0	4	0	3	0	Stone.
56	Solvay.....	49 and 50	9,054 + 82 Arch.....	194	0	3	0	3	0	Stone.
57	.....	49 and 50	9,091 + 19 Arch.....	135	0	3	0	3	0	Stone.
58	Munro.....	50 and 51	9,154 + 78 Arch.....	131	2	3	0	3	0	Stone.
59	Bennett's.....	50 and 51	9,246 + 31 Arch.....	135	0	4	0	4	0	Iron.
60	White Bottom brook.....	50 and 51	9,558 + 14 Pipe.....	133	0	4	0	4	0	Stone.
61	.....	50 and 51	9,651 + 64 Pipe.....	131	6	4	0	3	0	Stone.
62	Hennessey.....	50 and 51	9,749 + 59 Composite.....	89	0	8	0	4	0	W.ood.
63	Jordan aqueduct, west.....	50 and 51	9,786 + 66 Arch.....	131	10	6	0	3	0	W.ood.
64	Jordan, Gibson.....	50 and 51	9,828 + 99 Arch.....	120	10	4	0	2	0	Stone.
65	Jordan, Shearer's.....	51 and 52	9,859 + 22 Composite.....	131	0	4	0	3	0	W.ood.
66	Johnson's.....	51 and 52	9,908 + 43 Arch.....	131	0	4	0	4	0	Stone.
67	Rosa.....	51 and 52	9,930 + 11 Composite.....	129	9	4	0	3	0	W.ood.
68	.....	51 and 52	9,961 + 39 Arch.....	131	10	4	0	4	0	Stone.
69	William's.....	51 and 52	10,016 + 11 Composite.....	121	4	4	0	3	0	W.ood.
70	.....	51 and 52	10,040 + 92 Box.....	131	1	3	0	3	0	Stone.
71	.....	51 and 52	10,078 + 04 Composite.....	143	4	4	0	3	0	W.ood.
72	Cold Spring brook.....	51 and 52	10,217 + 83 Composite.....	111	9	3	0	3	0	W.ood.
73	Port Byron.....	51 and 52	10,228 + 70 Arch.....	108	11	4	0	2	0	Stone.
74	Port Byron.....	51 and 52	10,259 + 71 Arch.....	155	10	6	0	5	0	Stone.
75	.....	51 and 52	10,466 + 43 Arch.....	130	0	4	0	2	0	Stone.
76	Clark's.....	52 and 53	10,487 + 68 Arch.....	130	0	4	0	4	0	Stone.
77	.....	52 and 53	10,648 + 49 Composite.....	111	3	3	0	4	0	W.ood.
78	Evans.....	52 and 53	10,701 + 91 Composite.....	112	3	3	0	3	0	W.ood.
79	.....	52 and 53	.....	.....	.....	.....	.....	.....	.....	.....
80	.....	52 and 53	.....	.....	.....	.....	.....	.....	.....	.....
<i>Western Division.</i>										
1	Solo Platner.....	52 and 53	10,760 + 42 Round.....	137	0	3	0	3	0	Iron pipe.
2	C. H. Culver.....	52 and 53	10,816 + 16 Round.....	136	0	3	0	3	0	Iron pipe.
3	Chas. Chase.....	52 and 53	10,855 + 26 Box.....	126	0	3	0	3	0	Stone.
4	D. W. Parrish.....	52 and 53	10,906 + 49 Arch.....	122	0	4	0	4	0	Stone.
5	Peter Waldruff.....	52 and 53	10,938 + 57 Arch.....	118	0	6	0	4	0	Stone.
6	Horton's.....	52 and 53	10,996 + 58 Arch.....	118	6	6	0	4	0	Stone.
64	Tow-path.....	52 and 53	11,072 + 25 Round.....	48	0	1	8	1	1	Iron pipe.

\*Distances taken to centers of culverts.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

## TABLE OF CULVERTS—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.
						LENGTH.		SPAN.		HEIGHT.		
						Feet.	In.	Feet.	In.	Feet.	In.	
<i>*Western Division—(Continued).</i>												
7	Pitman's.	52 and 53	11,073 + 04 Arch.	.....	1	119	0	4	0	3	0	0 Stone.
7 1/4	Water pipe, Clyde.	52 and 53	11,082 + 59 Round.	.....	1	125	0	4	0	4	0	0 Iron pipe.
8	Village sewer, Clyde.	52 and 53	11,082 + 79 Box	.....	1	126	8	2	0	4	0	0 Stone.
9	Griddle's.	52 and 53	11,107 + 08 Round.	.....	2	130	0	2	0	2	0	0 Iron pipe.
10	Kirby's-Melvin brook.	52 and 53	11,144 + 15 Arch.	.....	1	128	0	10	0	6	0	0 Stone.
11	Gillett's.	53 and 54	11,209 + 14 Round.	.....	4	130	0	2	0	2	0	0 Iron pipe.
12	Black brook.	53 and 54	11,276 + 99 Composite.	.....	2	123	0	4	0	3	0	0 Wood.
13	Lent's.	53 and 54	11,300 + 23 Composite.	.....	1	122	0	4	0	3	0	0 Wood.
14	Cole's.	54 and 55	11,445 + 52 Arch.	.....	1	116	6	10	0	6	0	0 Stone.
14 1/2	Iron water pipe, Lyons.	54 and 55	11,477 + 74	.....	1	120	8	.....	.....	.....	.....	.....
15	Merrick's.	54 and 55	11,485 + 94	.....	1	120	0	.....	.....	.....	.....	0 Wood and stone.
15 1/2	Hill's.	55 and 56	11,541 + 55 Composite.	.....	1	125	0	3	0	2	0	0 Stone.
16	County house.	55 and 56	11,580 + 79 Box	.....	1	138	0	3	0	2	0	0 Wood.
17	Grolain's.	56 and 57	11,609 + 96 Composite.	.....	1	124	0	4	0	3	0	0 Stone.
18	Loomis.	56 and 57	11,648 + 18 Arch.	.....	1	122	0	4	0	4	0	0 Stone.
19	McIntyre.	59 and 60	11,722 + 11 Arch.	.....	1	116	6	8	0	3	0	0 Stone.
20	Cornell's.	59 and 60	11,813 + 91 Arch.	.....	1	161	0	6	0	4	0	0 Stone.
21	Bonty's.	59 and 60	11,939 + 61 Arch.	.....	1	149	0	6	0	3	0	0 Stone.
22	Sutton's.	59 and 60	12,143 + 96 Arch.	.....	1	161	0	10	0	6	0	0 Stone.
23	Main St., Palmyra.	59 and 60	12,204 + 76 Arch.	.....	1	161	0	7	0	6	0	0 Stone.
23 1/2	Gallup's.	60 and 61	12,234 + 89 Arch.	.....	2	200	0	3	0	2	0	0 Wood.
24	Discharge culvert, Tow-path.	61 and 62	12,440 + 14 Composite.	.....	1	164	0	3	0	2	0	0 Stone.
25	Thomas creek.	61 and 62	12,481 + 38 Round.	.....	5	45	0	1	8	1	1	8 Iron pipe.
26	Adams' creek.	61 and 62	12,802 + 22 Round.	.....	1	120	3	4	0	4	0	0 Iron pipe.
27	Devlin.	61 and 62	12,943 + 38 Round.	.....	1	144	0	2	6	3	0	0 Stone.
28	Moss.	61 and 62	12,998 + 57 Arch.	.....	1	152	0	4	0	2	0	0 Stone.
29		61 and 62	13,069 + 28 Arch.	.....	1	211	0	6	0	5	0	0 Stone.

\*Western Division—(Continued).

30	Irondequoit creek	61 and 62	13, 117 + 53 Arch.	324	4 Stone.
31	Pittsford	61 and 62	13, 211 + 86 Round.	329	6 Iron pipe.
32	Goss	61 and 62	13, 223 + 68 Round.	333	0 Stone.
33	Lanman's-Nyes creek.	61 and 62	13, 267 + 28 Arch.	358	0 Stone.
34	Cole's	61 and 62	13, 309 + 58 Arch.	461	0 Stone.
34a	Cole's	61 and 62	13, 383 + 32 Arch.	461	0 Stone.
34b	Cole's	61 and 62	13, 403 + 56 Box.	330	0 Stone.
35	Allen's creek	61 and 62	13, 413 + 85 Arch.	130	0 Stone.
36	Donnelly's	62 and 63	13, 452 + 19 Round.	131	0 Iron pipe.
37	Hold's	62 and 63	13, 479 + 35 Box.	132	0 Wood.
38	Drake's	62 and 63	13, 590 + 16 Arch.	162	0 Stone.
38a	Low-path, draining bottom.	62 and 63	13, 593 + 34 Round.	10	10 Iron pipe.
38b	Low-path, draining bottom.	63 and 64	13, 583 + 04 Round.	10	10 Iron pipe.
39	Field St.	63 and 64	13, 583 + 44 Round.	6	7 Brick.
40	East Side trunk sewer.	66 and 67	13, 613 + 74 Arch.	1	8 Iron pipe.
41	Griffith St, dry weather flow outlet.	66 and 67	13, 638 + 64 Round.	0	0 Stone.
42	Old 4th, 7th, 8th & 12th wards outlet sewer.	66 and 67	13, 670 + 84 Box.	0	0 Brick.
43	New outlet for old 4th, 7th & 12th wards.	66 and 67	13, 671 + 84 Round.	0	0 Iron pipe.
44	Exchange St. sewer.	66 and 67	13, 700 + 59 Round.	4	4 Iron pipe.
45	So. Fitzhugh St. sewer.	66 and 67	13, 704 + 59 Round.	1	0 Stone.
46	Utah Alley sewer.	66 and 67	13, 730 + 69 Box.	1	0 Iron pipe.
47	Cayor St. sewer.	66 and 67	13, 731 + 13 Box.	3	0 Stone.
48	Genesee Valley canal outlet sewer.	66 and 67	13, 753 + 04 Box.	150	0 Stone.
49	Old Platt St. sewer.	66 and 67	13, 768 + 04 Arch.	171	0 Stone.
50	Loyal and Saxton St. outlet.	66 and 67	13, 808 + 02 Arch.	130	0 Iron pipe.
51	Deep Hollow	66 and 67	13, 833 + 62 Round.	228	0 Stone.
52	Lexington Ave. sewer, extension.	66 and 67	13, 873 + 14 Arch.	145	0 Stone.
53	Todd	66 and 67	13, 893 + 86 Arch.	175	0 Stone.
54	Dunham	66 and 67	14, 040 + 44 Arch.	142	0 Stone.
55	Parkin's	66 and 67	14, 069 + 14 Arch.	133	0 Stone.
56	Lebeck's	66 and 67	14, 089 + 41 Arch.	145	0 Stone.
57	Carl's	66 and 67	14, 204 + 82 Arch.	133	0 Stone.
58	Millcock's	66 and 67	14, 303 + 35 Arch.	140	0 Stone.
59	Mill Pond	66 and 67	14, 328 + 57 Composite.	122	0 Stone.
60	Ballard's	66 and 67	14, 347 + 85 Arch.	154	0 Stone.
61	Brown's	66 and 67	14, 370 + 69 Arch.	161	0 Stone.
62	Webster's	66 and 67	14, 384 + 84 Arch.	156	0 Stone.
63	Webster's	66 and 67	14, 453 + 92 Arch.	149	0 Stone.
64	Cressey	66 and 67	14, 462 + 04 Arch.	183	0 Stone.
65	Armas Basin.	66 and 67	14, 476 + 18 Arch.	129	0 Stone.
66	Millner	66 and 67	14, 544 + 79 Composite.	144	0 Stone and wood.
67	Duffy's	66 and 67	14, 590 + 47 Round.	132	0 Iron pipe.
68	Wright's	66 and 67	14, 615 + 32 Round.	133	0 Iron pipe.
69	Cooley's Basin.	66 and 67	14, 655 + 66 Arch.	153	0 Stone.
70	Sayer's	66 and 67	14, 694 + 76 Arch.	140	0 Stone.
71	Golden Mill	66 and 67	14, 733 + 50 Arch.	140	0 Stone.
72	South St.	66 and 67	14, 733 + 50 Arch.	140	0 Stone.

\*Distances taken to centers of culverts.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
TABLE OF CULVERTS—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.
						LENGTH.		SPAN.		HEIGHT.		
						Feet.	In.	Feet.	In.	Feet.	In.	
<i>Western Division—(Continued).</i>												
59	Brookport.....	66 and 67	14,780 + 50' Round.....		1	146	6	4	0	4	0	0 Iron pipe.
60	Bennett.....	66 and 67	14,780 + 19' Box.....		1	151	6	4	0	3	0	0 Stone.
61	Spaulding's.....	66 and 67	14,826 + 79' Arch.....		1	155	7	6	0	4	0	0 Stone.
62	Miner's.....	66 and 67	14,852 + 82' Composite.....		1	141	10	2	0	3	0	0 Stone.
63	Gurfield's.....	66 and 67	14,881 + 31' Arch.....		1	154	10	6	0	3	0	10 Stone.
64	Hurd's.....	66 and 67	14,911 + 85' Arch.....		1	156	4	4	0	3	0	2 Stone.
65	Sandy creek.....	66 and 67	14,940 + 11' Arch.....		1	375	6	12	0	6	0	6 Stone.
65½	Old canal, Sandy creek.....	66 and 67	14,940 + 11' Arch.....		1	130	0	3	0	2	0	6 Stone.
66	Love's.....	66 and 67	14,967 + 03' Arch.....		1	160	1	4	0	3	0	10 Stone.
67	Robinson's.....	66 and 67	15,003 + 06' Arch.....		1	176	3	4	0	3	0	6 Stone.
68	Sprague's.....	66 and 67	15,022 + 01' Arch.....		1	192	9	4	0	2	0	1 Stone.
69	Phillip's.....	66 and 67	15,098 + 03' Arch.....		1	147	7	10	0	4	0	3 Stone.
70	Ford's.....	66 and 67	15,132 + 24' Arch.....		1	159	4	4	0	5	0	3 Stone.
71	Murray's.....	66 and 67	15,176 + 78' Arch.....		2	135	4	12	0	4	0	0 Stone.
72	Hindsburgh's.....	66 and 67	15,230 + 86' Arch.....		1	154	6	6	0	3	0	0 Stone.
73	Jaquith's.....	66 and 67	15,298 + 89' Arch.....		1	158	1	4	0	3	0	0 Stone.
74	German's.....	66 and 67	15,338 + 06' Arch.....		1	162	1	4	0	3	0	0 Stone.
75	Barre's.....	66 and 67	15,387 + 14' Box.....		1	97	8	2	0	2	0	6 Stone.
76	Sanford's.....	66 and 67	15,407 + 78' Arch.....		1	159	6	4	0	3	0	0 Stone.
77	Burrow's, dry dock.....	66 and 67	15,436 + 63' Arch.....		2	140	6	12	0	6	0	4 Stone.
78	Smith's.....	66 and 67	15,443 + 32' Box.....		1	159	6	3	0	1	0	0 Stone.
79	Batavia St.....	66 and 67	15,464 + 41' Box.....		1	243	9	2	10	3	0	5 Stone.
80	Burrow's.....	66 and 67	15,474 + 10' Composite.....		1	133	8	4	0	2	0	0 Wood.
81	Burrow's.....	66 and 67	15,494 + 07' Composite.....		1	141	7	4	0	2	0	9 Wood.
82	Burrow's.....	66 and 67	15,503 + 67' Arch.....		1	165	1	4	0	3	0	10 Stone.
83	Latin's.....	66 and 67	15,519 + 71' Composite.....		1	169	10	4	0	3	0	0 Wood.
84	Tripp's.....	66 and 67	15,538 + 05' Composite.....		1	148	6	4	0	3	0	0 Wood.
85	Stone's.....	66 and 67	15,579 + 08' Composite.....		1	143	4	4	0	3	0	0 Wood.

86	Other creek.....	66	and	67	15, 613 + 01 Arch.....	310	1	11	6	86	3 Stone.
87	Wilson's.....	66	and	67	15, 623 + 62 Composite.....	146	0	7	0	87	0 Wood.
88	Startweather's.....	66	and	67	15, 644 + 61 Arch.....	162	1	8	0	88	6 Stone.
89	Red's.....	66	and	67	15, 644 + 61 Arch.....	159	0	1	0	89	11 Stone.
90	Edch's.....	66	and	67	15, 717 + 35 Arch.....	192	1	4	0	90	0 Stone.
91	Highway town line.....	66	and	67	15, 737 + 35 Arch.....	163	0	4	0	91	0 Wood.
92	Knowlerville.....	66	and	67	15, 799 + 02 Composite.....	163	1	2	0	92	0 Stone.
93	Get's.....	66	and	67	15, 804 + 52 Arch.....	168	0	4	0	93	0 Stone.
94	Randall's.....	66	and	67	15, 848 + 85 Round.....	175	0	4	0	94	0 Stone.
95	Medina road.....	66	and	67	15, 876 + 04 Arch.....	167	2	10	6	95	3 Iron pipe.
96	Medina road.....	66	and	67	15, 882 + 04 Arch.....	167	0	10	0	96	3 Stone.
97	Medina road.....	66	and	67	15, 892 + 23 Arch.....	167	0	10	0	97	0 Stone.
98	Reynolds.....	66	and	67	15, 943 + 23 Composite.....	196	0	4	0	98	0 Wood.
99	Medina sewer.....	66	and	67	16, 033 + 05 Arch.....	145	0	2	0	99	0 Wood.
100	Graham's.....	66	and	67	16, 081 + 70 Composite.....	210	1	6	0	100	0 Stone.
101	Shelby Basin.....	66	and	67	16, 111 + 17 Arch.....	170	0	2	0	101	0 Stone.
102	Shelby Underhills.....	66	and	67	16, 153 + 54 Arch.....	180	0	3	0	102	0 Stone.
103	Shelby Basin.....	66	and	67	16, 173 + 72 Arch.....	177	0	12	0	103	7 Stone.
104	Royalton's.....	66	and	67	16, 264 + 56 Composite.....	144	2	0	0	104	0 Wood.
105	Middleport, Moors.....	66	and	67	16, 288 + 72 Composite.....	137	0	0	0	105	0 Wood.
106	Middleport, Crook's.....	66	and	67	16, 300 + 83 Composite.....	138	0	0	0	106	9 Wood.
107	Middleport, Press Co.'s pond.....	66	and	67	16, 303 + 51 Arch.....	141	0	12	0	107	0 Stone.
108	Watson's.....	66	and	67	16, 329 + 19 Composite.....	150	5	0	0	108	0 Wood.
109	Watson's.....	66	and	67	16, 385 + 28 Arch.....	228	4	0	0	109	11 Stone.
110	Wuck's.....	66	and	67	16, 451 + 69 Arch.....	193	0	4	0	110	0 Stone.
111	Reynolds Basin.....	66	and	67	16, 481 + 45 Arch.....	170	10	4	0	111	0 Stone.
112	Dewell's.....	66	and	67	16, 498 + 87 Composite.....	185	6	0	0	112	1 Wood.
113	Eighteen mile creek.....	66	and	67	16, 529 + 86 Arch.....	187	0	18	0	113	0 Stone.
114	Stephen's Basin.....	66	and	67	16, 561 + 15 Composite.....	141	1	0	0	114	0 Wood.
115	Carpenter-Balcecock.....	66	and	67	16, 580 + 06 Composite.....	179	0	4	0	115	0 Wood.
116	Bugbee's.....	66	and	67	16, 600 + 05 Round.....	225	5	0	0	116	0 Wood.
117	Maynard's.....	66	and	67	16, 657 + 34 Composite.....	159	9	1	0	117	0 Iron pipe.
118	Maynard's.....	66	and	67	16, 670 + 12 Arch.....	170	0	4	0	118	0 Stone.
119	Silaby's.....	66	and	67	16, 693 + 14 Arch.....	212	0	3	0	119	0 Stone.
120	Murrell, Lockport.....	66	and	67	16, 738 + 03 Arch.....	200	2	6	0	120	0 Stone.
121	Day's, Lockport.....	66	and	67	16, 763 + 29 Arch.....	226	0	6	0	121	10 Stone.
122	Wakeman's.....	66	and	67	16, 789 + 66 Arch.....	165	11	4	0	122	1 Stone.
123	McCollum's.....	66	and	67	16, 809 + 73 Arch.....	185	6	0	0	123	3 Stone.
124	Lockport dry dock.....	66	and	67	16, 846 + 75 Box.....	212	143	5	0	124	8 Wood.
125	Lockport.....	66	and	67	16, 883 + 88 Arch.....	142	6	2	0	125	11 Stone.

\* Distances taken to centers of culverts.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
 TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).  
 TABLE OF CULVERTS—(Concluded).

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.
						LENGTH.		SPAN.		HEIGHT.		
						Feet.	In.	Feet.	In.	Feet.	In.	
<i>Western Division—(Concluded).</i>												
1286	McDonald's.....	71 and 72	17,228 + 55	Box.....	2	68	0	3	0	5	5	6 Stone.
129	State Ditch.....	71 and 72	17,817 + 23	Round.....	6	194	0	6	0	6	0	0 Iron pipe.
130	Three mile creek.....	71 and 72	18,043 + 66	Round.....	1	168	10	4	0	4	0	0 Iron pipe.
131	Cornelius creek.....	71 and 72	18,278 + 64	Round.....	4	159	0	5	0	5	0	0 Iron pipe.

\* Distances taken to centers of culverts.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF DAMS.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	LENGTH.		MEAN HEIGHT.		Material in dam.	Material in apron.	Material in bulk- head.	Number of gates.	Curved or straight.	Eleva- tion of crest.
				Feet.	In.	Feet.	In.						
Eastern Division.													
1	Rexford Flats.....	22 and 23	1,328 + 58	675	0	9	0	Stone.....	Timber & steel..	Wood....		2 Straight.....	209.73
2	Fort Hunter.....	29 and 30	3,553 + 96	586	6	13	5	Wood.....	Wood.....	Wood....		4 Straight.....	281.83
3	Rocky Rift feeder.....	35 and 36	4,346 + 91	360	8	4	7	Stone.....	Wood & stone..	Wood....		4 Straight.....	319.80
4	Little Falls, south channel.....	39 and 40	4,607 + 95	352	5	5	8	Stone.....	No apron.....			.....	363.03
4a	Little Falls, north channel.....	39 and 40	4,609 + 35	248	0	3	5	Stone.....	No apron.....			.....	363.28

\*Distances taken to stations on tow-path opposite which dams are located.



## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF FEEDER DAMS.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction to feeder entering canal	LENGTH of SPILL WAY.		HEIGHT.		Material in dap.	Material in apron.	Material in bulk- head.	Material in abut- ments.	Number of gates.	Curved or straight.
				Feet.	In.	Feet.	In.						
Middle Division.													
1	Oriskany creek feeder.....	46 and 47	6,101 + 20	214	4	9	0	Stone and wood	Stone and wood	Wood	Wood	.....	Straight.
2	Mohawk, Rome feeder.....	46 and 47	6,517 + 61	180	0	7	0	Stone and wood	Stone	.....	Stone	.....	Straight.
3	Oneida creek feeder.....	46 and 47	7,366 + 73	89	0	7	0	Stone and wood	Stone	.....	Wood	.....	4 Straight.
4	Cowasselon creek feeder....	46 and 47	7,454 + 80	80	0	4	0	Stone and wood	Stone and wood	Wood	Wood	.....	6 Straight.
5	Chittenango creek feeder....	46 and 47	7,966 + 43	100	0	7	0	Stone and wood	Wood	Wood	Stone	.....	2 Straight.
6	Limestone creek feeder.....	46 and 47	8,401 + 98	100	0	7	0	Stone and wood	Wood	Wood	Stone	.....	2 Straight.
7	Butternut creek feeder.....	46 and 47	8,517 + 48	81	0	7	0	Stone and wood	Stone	.....	Stone	.....	Straight.
8	Camillus creek feeder.....	50 and 51	9,264 + 63	83	0	7	0	Stone and wood	Wood	.....	Stone	.....	Straight.
9	Carpenter brook feeder.....	50 and 51	9,548 + 66	60	0	7	0	Stone and wood	Wood	.....	Stone	.....	Straight.
10	Stancatese, Jordan feeder....	50 and 51	9,788 + 80	60	0	4	10	Stone and wood	Wood	Wood	Stone	.....	4 Straight.
11	Futnam brook feeder.....	51 and 52	10,017 + 86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	Centerport feeder.....	51 and 52	10,143 + 91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	Owasco creek feeder.....	51 and 52	10,240 + 88	119	0	.....	.....	Wood	.....	.....	Wood	.....	Straight.

\*Distances taken to stations on tow-path opposite which dams are located.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF RESERVOIR DAMS.

No.	NAME.	North or south of the Erie canal.	LENGTH OF SPILLWAY.		HEIGHT.		Material in dam.	Material in apron.	Material in bulk- head.	Material in abut- ments.	Number of gates.	Curved or straight.
			Feet.	In.	Feet.	In.						
Middle Division.												
1	Woodhull lake.....	North.....	60		0		Earth.....		Stone.....	Wood.....	.....	Straight.
2	Sand lake.....	North.....	285		0		Stone.....		Stone.....	Stone.....	.....	Straight.
3	North lake.....	North.....	60		0		Earth.....		Wood.....	Wood.....	.....	Straight.
4	South lake.....	North.....	60		0	28	Earth.....		Wood.....	Wood.....	.....	Straight.
5	Casachaga lake.....	North.....	60		0		Earth.....		Wood.....	Wood.....	.....	Straight.
6	Baboy lake.....	North.....	30		0		Earth.....		Wood.....	Wood.....	.....	Straight.
7	Twiss lake.....	North.....	25		0	10	Earth.....		Wood.....	Stone.....	.....	Straight.
8	White lake.....	North.....	19		0		Earth.....		Stone.....	Stone.....	.....	Straight.
9	Forestport.....	North.....	315		0	27	Stone and Wood.....		Stone.....	Stone.....	.....	Straight.
10	Forestport pond.....	North.....	200		0	20	Stone and Wood.....		Stone.....	Stone.....	.....	Straight.
1	Madison brook.....	South.....	40		0		Earth.....		Stone.....	Stone.....	.....	Straight.
2	Leland's pond.....	South.....	5		0		Earth.....		Wood.....	Wood.....	.....	Straight.
3	Kingsley's brook.....	South.....	16		0		Earth.....		Wood.....	Wood.....	.....	Straight.
4	Eaton brook.....	South.....	.....		0		Earth.....		Wood.....	Wood.....	.....	Straight.
5	Bradley brook.....	South.....	20		0		Earth.....		Wood.....	Wood.....	.....	Straight.
6	Hatch's lake.....	South.....	.....		0		Earth.....		Wood.....	Wood.....	.....	Straight.
7	Erleville.....	South.....	16		0		Earth.....		Wood.....	Wood.....	.....	Straight.
8	Casenovia lake.....	South.....	102	6	9	6	Stone.....		Stone.....	Stone.....	.....	Straight.
9	De Ruyter.....	South.....	16		0	15	Earth.....		Stone.....	Wood.....	.....	Straight.
10	Janessville.....	South.....	205		0		Stone.....		Stone.....	Stone.....	.....	Straight.
11	Otisco lake.....	South.....	40		0		Stone.....		Stone.....	Stone.....	.....	Straight.
12	Skaneateles lake.....	South.....	48		0	15	Stone.....		Stone.....	Stone.....	.....	Straight.
13	Owasco lake.....	South.....	93		0		Stone.....		Stone.....	Stone.....	.....	Straight.
1	Eaton brook feeder.....	Turning streams to the north.....	.....		0		Wood.....		.....	Stone.....	.....	Straight.
2	Bradley brook feeder.....	.....	60		0		Stone.....		.....	Stone.....	.....	Straight.
3	Kingsley brook feeder.....	.....	60		0		Stone.....		.....	Stone.....	.....	Straight.
4	Toughnoga creek feeder.....	.....	80		0		Stone.....		.....	Stone.....	.....	Straight.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF DAMS.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	LENGTH.		HEIGHT.		Material in dam.	Material in apron.	Material in bulk- head.	Number of gates.	Curved or straight.	ELEVATIONS.	
				Feet.	In.	Feet.	In.						Crest.	Flash boards.
Western Division.														
1	Cuba or Oil creek reservoir. Alle- gany county....		Off line of canal	2,200	0	65	0	Timber....		Timber....		3 Straight.		
2	Genesee river, in rains.....		Off line of canal	501	6	5	0	Timber....		Timber....		Curved..		
3	Scottsville.....		Off line of canal	111	0	11	0	Timber....		Timber....		Curved..		
4	Oak Orchard creek		Off line of canal	150	0	1	4	Timber brush & gravel		Timber brush & gravel		Curved..		
5	Tonawanda.....	Sulphur Springs guard-lock & Black Rock guard-lock...	17,891 + 12	194	6	3	0	Timber brush & gravel....		Timber brush & gravel....		12 Curved..	570.22	571.52
6	Vally, 2 miles from Cuba.....		Off line of canal	210	7	2	6	Timber brush & gravel....		Timber brush & gravel....				

\*Distances taken to stations on tow-path opposite which dams are located.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF FEEDERS AND RESERVOIRS.

No.	NAME.	FEEDERS ENTER CANAL.		Location.	FEEDER DAMS.		SPILLWAYS.		Sources of water-supply.		
		Location: between locks.	Continuous stations from Hudson river junction.		Length.	Height.					
							Feet.	In.		Feet.	In.
Middle Division.											
1	Oriskany creek feeder.....	46 and 47	6,101 + 81	3,076 feet south of canal.....	214	0	9	0	Madison brook reservoir, Leeland's ponds, Kingsley brook reservoir, Bradley brook reservoir, Hatch's lake, Eaton brook reservoir and summit level, Chenango canal.		
2	Mohawk feeder at Rome.....	46 and 47	6,517 + 62	495 feet below feeder, east of canal.....	182	9	5	0	Canachagula lake reservoir, Wood-hull lake reservoir, Sand lake reservoir, North lake reservoir, South lake reservoir, Twin lakes, Forestport reservoir, Forestport pond and Black and Mohawk rivers.		
3	Black river canal.....	46 and 47	6,527 + 61	Canal at Rome.....	32	0	9	2	Wood creek.		
4	Wood creek feeder.....	46 and 47	6,568 + 64	At canal tow-path.....	89	0	10	2	Oneida creek.		
5	Oneida creek feeder.....	46 and 47	7,367 + 04	15,338 feet south of canal.....	79	0	5	0	Cowasselon creek.		
6	Cowasselon creek feeder.....	46 and 47	7,454 + 86	2,046 feet south of canal.....	99	9	8	0	Eriville reservoir, Cazenovia lake and Chittenango creek.		
7	Chittenango creek feeder.....	46 and 47	7,966 + 46	1,399 feet south of canal.....	100	0	7	6	De Ruyter reservoir, Toughnioga creek and Limestone creek.		
8	Limestone creek feeder.....	46 and 47	8,404 + 20	At Fayetteville, 4,406 feet south of canal..							

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF FEEDERS AND RESERVOIRS—Continued.

No.	NAME.	FEEDERS ENTER CANAL.		Location.	FEEDER DAMS.				Sources of water-supply.
		Location: between locks.	Continuous stations from Hudson river junction.		SPILLWAYS.		HEIGHT.		
					LENGTH.	In.			
								Feet.	
Middle Division—(Continued).									
9	Butternut creek feeder.....	46 and 47	8,517 + 70	11,706 feet south of canal.....	81	0	5	3 Jamesville reservoir and Butternut creek.	
10	Camillus feeder.....	50 and 51	9,264 + 74	8,725 feet south of canal.....	83	0	.....	Otisco lake reservoir and Nine Mile creek.	
11	Carpenter brook feeder.....	50 and 51	9,648 + 63	792 feet south of canal.....	60	0	.....	Carpenter Brook.	
12	Stanestates creek feeder at Jordan.....	50 and 51	9,788 + 55	495 feet south of canal at Jordan.....	60	0	4	6 Stanestates lake and Stanestates creek.	
13	Putnam Brook feeder.....	51 and 52	10,016 + 81	South of canal at Woodport.....	.....	.....	.....	Putnam brook.	
14	Centerport feeder.....	51 and 52	10,144 + 11	1,188 feet south of canal.....	12	0	8	0 Cold Spring brook.	
15	Port Byron feeder*.....	51 and 52	10,240 + 43	11,088 feet south of canal.....	119	0	4	0 Owaseo lake and Owaseo outlet.	

\*A wrought-iron pipe, 42 inches in diameter and 850 feet long, conducts the water from the well-house at the end of the open feeder to the canal.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF LOCKS.

No.	NAME.	Continuous stations * from Hudson river junction.	Single or double lock.	Lengthened— at head or foot—low-path or berms side.	Lift, (computed from lower miter-sill elevations). Feet.	Direction of lift or descent.	Elevation of lower † miter sill.	Observed elevation of mean water-surface, 1906.†
<i>Eastern Division.</i>								
1	Hudson river, Albany.....	2 + 27	Double.....	Not lengthened.....	15.09	Lift, west.....	-6.250	4.155
2	Lumber district, Albany.....	67 + 11	Double.....	Not lengthened.....	9.499	Lift, west.....	+8.840	16.470
3	Erie and Champlain junction.....	843 + 56	Double.....	Not lengthened.....	11.136	Lift, west.....	+18.339	26.081
4	Cohoes.....	360 + 16	Double.....	Not lengthened.....	11.208	Lift, west.....	29.475	36.963
5	Cohoes.....	375 + 43	Double.....	Not lengthened.....	10.774	Lift, west.....	40.683	49.070
6	Cohoes.....	386 + 37	Double.....	Not lengthened.....	10.146	Lift, west.....	51.457	59.200
7	Cohoes.....	393 + 56	Double.....	Not lengthened.....	9.930	Lift, west.....	61.603	68.640
8	Cohoes.....	402 + 05	Double.....	Not lengthened.....	10.123	Lift, west.....	71.533	78.760
9	Cohoes.....	419 + 19	Double.....	Not lengthened.....	10.013	Lift, west.....	81.656	88.720
10	Cohoes.....	428 + 64	Double.....	Not lengthened.....	9.921	Lift, west.....	91.669	98.90
11	Cohoes.....	436 + 84	Double.....	Not lengthened.....	9.989	Lift, west.....	101.590	108.74
12	Cohoes.....	445 + 04	Double.....	Not lengthened.....	10.017	Lift, west.....	111.579	119.14
13	Cohoes.....	455 + 60	Double.....	Not lengthened.....	9.768	Lift, west.....	121.596	129.08
14	Cohoes.....	466 + 89	Double.....	Not lengthened.....	10.217	Lift, west.....	131.364	139.07
15	Cohoes.....	481 + 13	Double.....	Not lengthened.....	10.011	Lift, west.....	141.581	149.00
16	Cohoes.....	491 + 17	Double.....	Not lengthened.....	9.958	Lift, west.....	151.592	158.93
17	Cohoes.....	507 + 95	Double.....	Not lengthened.....	10.083	Lift, west.....	161.550	169.30
18	Cohoes.....	518 + 05	Double.....	Not lengthened.....	10.318	Lift, west.....	171.633	178.91
19	Niskayuna.....	985 + 78	Double.....	Foot, berms.....	8.439	Lift, west.....	181.951	189.54
20	Fowler's.....	1,130 + 77	Double.....	Foot, berms.....	8.570	Lift, west.....	190.390	198.31
21	Aqueduct, lower.....	1,300 + 87	Double.....	Foot, berms.....	12.650	Lift, west.....	198.960	208.10
22	Aqueduct, upper.....	1,208 + 78	Double.....	Foot, berms.....	12.040	Lift, west.....	211.610	220.00
23	Schenectady.....	1,674 + 14	Double.....	Foot, berms.....	7.890	Lift, west.....	223.650	230.00
24	Schenectady.....	1,715 + 87	Double.....	Foot, berms.....	8.210	Lift, west.....	231.540	239.60
25	Rottersdam.....	1,916 + 67	Double.....	Foot, berms.....	7.770	Lift, west.....	239.750	248.00
26	Phillip's.....	2,264 + 11	Double.....	Foot, berms.....	8.010	Lift, west.....	247.520	256.00
27	Phillip's.....	2,264 + 73	Double.....	Foot, berms.....	8.120	Lift, west.....	255.530	262.50

\*Distances taken to upper hollow quoins.

†Taken generally by adding 0.66 ft. (original height of sill above lining-plank, before repairs) to elevation of lock-floor.

‡Taken generally at the stain left on walls by water-surface.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF LOCKS—(Continued).

No.	NAME.	Continuous stations* from Hudson river junction.	Single or double lock.	Lengthened— at head or foot—low-path or Berne side.	Lift, (computed from lower miter-sill elevations), Feet.	Direction of lift or descent.	Elevation of lower † miter-sill.	Observed elevation of mean water-surface, 1905. ‡
<i>Eastern Division—(Continued).</i>								
28	Yankee Hill.	2,540 + 41	Double.	Foot, berme.	7,740 Lift.	west.	263.650	270.89
29	Fort Hunter.	2,644 + 37	Double.	Foot, berme.	7,720 Lift.	west.	271.390	278.59
30	Fort Hunter.	2,677 + 76	Double.	Foot, berme.	10,530 Lift.	west.	279.110	286.74
31	Sprakers.	3,409 + 95	Double.	Foot, berme.	6,046 Lift.	west.	289.640	296.80
32	Fort Plain.	3,744 + 03	Double.	Foot, berme.	7,759 Lift.	west.	295.958	303.00
33	St. Johnsville.	4,014 + 17	Double.	Head, berme.	6,031 Lift.	west.	303.443	310.63
34	Mindenville.	4,150 + 12	Double.	Foot, berme.	8,184 Lift.	west.	309.478	317.06
35	Indian Castle.	4,317 + 82	Double.	Foot, berme.	7,500 Lift.	west.	317.660	325.00
36	Little Falls.	4,549 + 38	Double.	Foot, berme.	10,000 Lift.	west.	325.160	332.90
37	Little Falls.	4,582 + 35	Double.	Foot, berme.	10,300 Lift.	west.	335.160	343.20
38	Little Falls.	4,591 + 36	Double.	Foot, berme.	9,300 Lift.	west.	345.460	353.50
39	Little Falls.	4,617 + 00	Double.	Foot, berme.	10,040 Lift.	west.	354.760	363.60
40	Jacksonville.	4,748 + 80	Double.	Foot, berme.	8,000 Lift.	west.	364.800	372.50
41	Fort Herkimer.	4,887 + 98	Double.	Foot, berme.	7,860 Lift.	west.	372.800	382.50
42	Nohawk.	5,039 + 21	Double.	Foot, berme.	8,100 Lift.	west.	380.960	387.50
43	Nohawk.	5,052 + 83	Double.	Foot, berme.	8,000 Lift.	west.	388.760	397.40
44	Ilion.	5,195 + 48	Double.	Foot, berme.	11,000 Lift.	west.	396.760	405.40
45	Frankfort.	5,240 + 40	Double.	Foot, berme.	10,949 Lift.	west.	407.760	416.00
	Albany, weigh-lock.	10 + 10	Single.					
	Watervliet, weigh-lock.	322 + 00	Single.					
	Watervliet side-cut, lower.							
1	Watervliet side-cut, combined.	243 + 30	Single.	Not lengthened.	13,125 Lift.	west.	-6.120	3.990
2	Watervliet side-cut, combined.	243 + 30	Single.	Not lengthened.	11,334 Lift.	west.	+7.005	14.150
1	Watervliet side-cut, upper.							
2	Watervliet.	305 + 35	Double.	Not lengthened.	12,320 Lift.	west.	-6.030	4.250
2	Watervliet.	306 + 10	Double.	Not lengthened.	12,049 Lift.	west.	+6.290	15.270

## Middle Division.

46	Utica.....	5,794 + 31	Double	Head, tow-path.....	3,319 Lift, west.....	\$416,709	426,399
47	Canal bottom, summit level.....	8,748 + 36	Double	Foot, berme.....	10,079 Descent, west.....	422,028	419,489
48	Syracuse.....	8,758 + 33	Double	Foot, berme.....	10,291 Descent, west.....	411,849	408,578
49	Syracuse.....	8,796 + 07	Double	Head, berme.....	6,915 Descent, west.....	401,538	402,573
50	Cere's.....	9,062 + 05	Double	Foot, berme.....	7,965 Lift, west.....	\$382,743	402,573
51	Canal bottom, summit level.....	9,848 + 44	Double	Foot, berme.....	5,732 Descent, west.....	402,705	404,50
52	Fort Byron.....	10,260 + 30	Double	Foot, berme.....	11,298 Descent, west.....	396,973	393,11
	Syracuse, weigh-lock.....	8,810 + 39	Single			385,675	

## Western Division.

53	Clyde.....	11,149 + 41	Double	Foot, berme.....	4,63 Lift, west.....	386,18	392,98
54	Berlin.....	11,316 + 20	Double	Foot, berme.....	7,70 Lift, west.....	390,81	398,12
55	Lyons.....	11,483 + 89	Double	Head, tow-path.....	5,96 Lift, west.....	398,51	405,57
56	Poorhouse.....	11,583 + 34	Double	Foot, berme.....	10,12 Lift, west.....	404,47	412,51
57	Lockville, lower.....	11,750 + 10	Double	Not lengthened.....	8,03 Lift, west.....	414,59	422,11
58	Lockville, middle.....	11,759 + 46	Double	Not lengthened.....	7,93 Lift, west.....	422,62	429,75
59	Lockville, upper.....	11,767 + 68	Double	Not lengthened.....	7,88 Lift, west.....	430,55	438,30
60	Macedon, lower.....	12,407 + 82	Double	Foot, berme.....	10,02 Lift, west.....	438,43	446,00
61	Macedon, upper.....	12,451 + 38	Double	Foot, berme.....	6,69 Lift, west.....	448,45	456,41
62	Pittsford.....	13,357 + 84	Double	Foot, berme.....	9,22 Lift, west.....	455,14	462,87
63	Brighton.....	13,508 + 35	Double	Foot, berme.....	8,81 Lift, west.....	464,36	471,41
64	Sipples.....	13,536 + 60	Double	Foot, berme.....	10,15 Lift, west.....	473,17	480,67
65	Reservoir.....	13,612 + 41	Double	Foot, berme.....	10,03 Lift, west.....	483,32	490,39
66	Lockport, combined.....	16,915 + 55	Double	Foot, berme.....	11,22 Lift, west.....	493,35	500,70
67	Lockport, combined.....	16,916 + 65	Double	Not lengthened.....	11,22 Lift, west.....	506,04	513,02
68	Lockport, combined.....	16,917 + 75	Double	Not lengthened.....	11,18 Lift, west.....	517,26	524,25
69	Lockport, combined.....	16,918 + 85	Double	Not lengthened.....	11,18 Lift, west.....	528,48	535,52
70	Lockport, combined.....	16,919 + 95	Double	Not lengthened.....	11,04 Lift, west.....	539,66	546,74
71	Sulphur Springs guard-lock.....	17,194 + 15	Single	Not lengthened.....	9,50 No lift.....	550,70	557,97
	Niagara river, Tonawanda.....	17,896 + 31	Single	Not lengthened.....		560,20	571,20
72	Black Rock, guard-lock.....	18,310 + 33	Double	Not lengthened.....	Lift, south.....	558,20	567,54
	Black Rock, ship-lock.....		Single	Foot, tow-path.....		560,53	573,36
	Harbor.....			Not lengthened.....			
	Weight-lock, Rochester.....	13,679 + 84	Single	Not lengthened.....	Lift, south.....	557,88	568,31

\*Distances taken to upper hollow quoins.

†Taken generally by adding 0.66 ft. (original height of sill above lining plank, before repairs) to elevation of lock-floor.

‡Taken generally at the stain left on walls by water-surfaces.

§Locks Nos. 46, 49 and 50 were deepened 2 feet during 1896 improvement; lifts computed after adding 2 feet to elevations of present miter-sills.

||Grade of 3.16 feet between locks Nos. 66 and 67.



## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF STOP GATES.

No.	NAME.	Location between locks.	Continuous stations* from Hudson river junction.	WIDTH OF WATERWAYS.		Number of water-ways.	Number of gates.	Kind of gates.	Facing towards.	For protection of.	Distance protected in miles.
				Feet.	Inches.						
1	East Syracuse.....	46 and 47	8,721 + 29	40	0	1	1	1 Tumble ...	East.....	Syracuse.....	0.6
<i>Middle Division.</i>											
1	Bushnell's Basin.....	61 and 62	13,060 + 38	40	6	1	1	1 Tumble ...	East.....	Iron'quoit bank	1.60
2	Carterville.....	61 and 62	13,164 + 44	40	6	1	1	1 Tumble ...	West.....	Iron'quoit bank	1.60
<i>Western Division.</i>											
3	(Abandoned)										
4	Adams Basin.....	66 and 67	14,506 + 39	49	0	1	1	4 Swing.....	E. and W.	High bank	18.09
5	Holly, east.....	66 and 67	14,925 + 98	39	6	1	1	2 Swing.....	E. and W.	High bank	18.17
6	Holly, west.....	66 and 67	15,043 + 82	40	0	1	1	1 Tumble ...	East.....	Holly bank	2.23
7	Medina.....	66 and 67	16,888 + 43	39	0	1	1	1 Tumble ...	West.....	Road culvert..	18.21

\*Distances taken to centers of gates.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE ERIE CANAL—(Continued).

TABLE OF STREAM RECEIVERS.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	RECEIVER SPILLWAYS.				Side of canal.
				LENGTH.		HEIGHT.		
				Feet.	In.	Feet.	In.	
<i>Middle Division.</i>								
1	Ballou creek, Utica.....	45 and 46	5,718 + 84	34	0	9	0	6 Berme.
2	Oriskany feeder, Oriskany.....	46 and 47	6,101 + 81	36	0	7	0	0 Berme.
3	Whitall creek, Stanwix.....	46 and 47	6,457 + 83	30	0	10	0	0 Berme.
4	Mohawk feeder, Rome.....	46 and 47	6,517 + 82	.....	.....	.....	.....	Low-path.
5	Gilley brook, Jordan level.....	50 and 51	9,448 + 17	13	4	11	.....	0 Berme.
6	Carriager brook feeder, Jordan level.....	50 and 51	9,648 + 63	18	4	4	.....	0 Berme.
7	Skaneateles creek feeder, Jordan level.....	50 and 51	9,788 + 55	.....	.....	.....	.....	0 Berme.
8	Putnam brook feeder, Wedderport.....	51 and 52	10,016 + 81	20	6	5	.....	0 Berme.
9	Cold Spring brook feeder, Wedderport.....	51 and 52	10,144 + 11	12	0	8	.....	0 Berme.
10	Centerport receiver, Centerport.....	51 and 52	10,146 + 33	20	6	5	.....	0 Berme.
11	Herring brook, Port Byron.....	51 and 52	10,173 + 51	20	6	5	.....	0 Berme.
12	Owasco feeder, Port Byron.....	51 and 52	10,240 + 43	10	0	5	.....	0 Berme.
<i>Western Division.</i>								
1	White's receiver.....	61 and 62	12,638 + 89	60	0	3	.....	6 Berme.

\*Distances taken to centers of receiver spillways.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE ERIE CANAL—(Concluded).

TABLE OF WASTE-WEIRS AND SPILLWAYS.

No.	NAME.	Location: between locks.	Continuous stations* from Hudson river junction.	Side of canal.	LENGTH OF SPILLWAY.		Number of spill- ways.	LENGTH OF GATES.		HEIGHT OF GATES.		Eleva- tion of spill- way.	Spillway or weir.	Material in butt- head.
					Feet.	In.		Feet.	In.	Feet.	In.			
Eastern Division.														
1	United States Arsenal.	2 and 3	269 + 19 Berne.		33	0	10	4	2	6	3	0	26.37 Both.	Wood.
1a	Dry river at 13th street.	2 and 3	272 + 03 Berne.		45	5	1						24.88 Spillway.	Wood.
2	Mohawk Basin, Wat'vilet	2 and 3	309 + 77 Tow-path.		20	6	1						15.27 Both.	Wood.
3		3 and 4	357 + 23 Berne.		30	0	10	4	10	3	7	4	38.963 Both.	Wood.
4		9 and 10	424 + 91 Berne.		12	9	1	2	8	0	3	0	38.961 Both.	Wood.
5		18 and 19	429 + 18 Tow-path.		28	6	2	4	2	9	3	2	189.472 Both.	Wood.
6		20 and 21	1,137 + 75 Tow-path.		17	0	1	3	3	0	3	0	208.149 Both.	Steel.
7	(Abandoned)	22 and 23	1,550 + 86											
8	Port Jackson.	27 and 28	2,371 + 73 Tow-path.		13	4	1	3	3	0	4	0	271.161 Weir.	Wood.
9		30 and 31	3,401 + 43 Tow-path.		12	0	1	3	3	0	2	6	296.571 Weir.	Wood.
10		33 and 34	4,016 + 62 Berne.		19	7	1	3	2	9	2	9	317.149 Weir.	Wood.
11	St. Johnsville	33 and 34	4,038 + 42 Tow-path.		11	11	1	3	2	9	2	9	317.000 Weir.	Wood.
12	Fink's Basin.	35 and 36	4,506 + 41 Tow-path.		13	0	1	5	2	0	2	10	333.200 Weir.	Wood.
13		36 and 37	4,549 + 79 Tow-path.		11	2	1	2	3	0	3	0	343.200 Weir.	Wood.
14		39 and 40	4,612 + 46 Tow-path.		80	0	3	4	2	0	3	1	373.233 Both.	Wood.
15		40 and 41	4,756 + 00 Tow-path.		12	0	2							Wood.
16	Fort Herkimer.	41 and 42	4,894 + 30 Berne.		76	6	2	3	2	9	2	9	389.175 Both.	Steel.
17	(Abandoned)	42 and 43	5,050 + 20										405.026 Both.	Wood.
18		43 and 44	Berne.											
Middle Division.														
1	Ballou creek.	45 and 46	5,716 + 13 Tow-path.		72	9	1	4	2	2	0	4	426.177 Spillway.	Wood.
2	Teff's.	46 and 47	6,328 + 53 Tow-path.		100	0	1	1	2	0	0	0	429.486 Spillway.	Stone.
3	Fort Bull.	46 and 47	6,683 + 47 Tow-path.		99	10	1	1	2	2	6	6	429.362 Spillway.	Wood.
5	Durhamville.	46 and 47	7,359 + 53 Tow-path.		20	0	1	5	2	2	0	10	429.276 Spillway.	Steel.
6	Pools brook.	46 and 47	8,136 + 80 Tow-path.		13	0	1	1	1	1	1	6	430.15 Spillway.	Wood.
7	Amos flour mill.	49 and 50	8,837 + 60 Berne.		99	1	1	1	1	1	1	7	401.51 Spillway.	Stone.
8	Carpenter's brook.	50 and 51	9,652 + 59 Tow-path.		27	0	2	6	2	0	2	6	409.774 Spillway.	Wood.
9	Putnam brook.	51 and 52	10,016 + 95 Tow-path.		17	6	2	6	2	0	2	6	403.916 Spillway.	Wood.

**Western Division**

1	Clyde.....	52 and	53	11, 143 + 03	Berne.....	21 <sup>1</sup>	10 <sup>1</sup>	1	1	2	3	6	3	6	383, 762	Both.....	Wood.
2	Berlin.....	53 and	54	11, 285 + 70	Berne.....	8	6	1	1	1	1	1	2	6	398, 229	Both.....	Wood.
3	Lyona.....	54 and	55	11, 444 + 07	Berne.....	28	2	1	1	1	1	1	2	6	405, 470	Both.....	Wood.
4	Newark.....	59 and	60	11, 810 + 33	Tow-path.....	8	0	0	0	0	0	0	2	8	445, 066	Both.....	Steel.
5	Fairport.....	61 and	62	12, 863 + 38	Tow-path.....	45	0	0	0	0	0	0	2	2	462, 510	Both.....	Wood.
6	Cartersville.....	61 and	62	13, 171 + 40	Tow-path.....	45	0	0	0	0	0	0	2	2	462, 678	Both.....	Steel.
7	Brighton.....	62 and	63	13, 422 + 54	Berne.....	29	0	0	0	0	0	0	2	2	471, 546	Both.....	Steel.
8	Rochester.....	66 and	67	13, 678 + 22	Berne.....	49	5	0	0	0	0	0	2	2	508, 405	Both.....	Stone.
9	Spencerport.....	66 and	67	14, 301 + 50	Tow-path.....	10	0	5	0	0	0	0	2	0	509, 939	Weir.....	Concrete.
10	Adams Basin.....	66 and	67	14, 473 + 55	Berne.....	32	3	4	3	3	3	3	2	0	509, 772	Both.....	Wood.
11	Holley.....	66 and	67	14, 739 + 18	Tow-path.....	56	3	4	3	3	3	3	1	2	510, 465	Both.....	Wood.
12	Holley.....	66 and	67	14, 985 + 75	Berne.....	69	9	11	1	1	1	1	1	3	510, 314	Both.....	Wood.
13	Holley.....	66 and	67	Old	Tow-path.....	69	11	1	1	1	1	1	1	3	511, 078	Both.....	Stone.
14	Brookville.....	66 and	67	15, 176 + 78	Berne.....	31	0	0	0	0	0	0	2	0	511, 764	Both.....	Stone.
15	Albion, dry dock.....	66 and	67	15, 436 + 95	Berne.....	56	9	0	0	0	0	0	2	2	511, 227	Both.....	Wood.
16	Eagle Harbor.....	66 and	67	15, 620 + 20	Berne.....	40	0	8	0	0	0	0	2	3	517, 821	Both.....	Wood.
17	Medina.....	66 and	67	16, 014 + 93	Berne.....	54	0	0	0	0	0	0	2	10	517, 227	Both.....	Wood.
18	Middleport.....	66 and	67	16, 303 + 04	Berne.....	60	0	0	0	0	0	0	2	2	512, 416	Both.....	Steel.
19	Middleport.....	66 and	67	16, 386 + 39	Berne.....	16	0	5	0	0	0	0	2	2	512, 092	Both.....	Stone.
20	Johnson's creek.....	66 and	67	16, 532 + 88	Berne.....	22	0	0	0	0	0	0	2	2	512, 704	Both.....	Steel.
21	Mabess.....	66 and	67	16, 801 + 79	Berne.....	22	0	0	0	0	0	0	2	2	513, 167	Both.....	Steel.
22	Lockport.....	66 and	67	16, 809 + 87	Berne.....	20	0	0	0	0	0	0	5	2	512, 262	Spillway.....	Wood.
23	Franklin mill flume.....	66 and	67	16, 917 + 13	Berne.....	73	8	1	1	1	1	1	5	0	512, 262	Weir.....	Wood.
24	State discharge culvert.....	70 and	71	16, 917 + 13	Berne.....	73	8	1	1	1	1	1	5	0	512, 262	Weir.....	Wood.
25	Hydraulic race.....	70 and	71	16, 917 + 13	Berne.....	73	8	1	1	1	1	1	5	0	512, 262	Weir.....	Wood.
26	Lockport, city water-wks.....	70 and	71	16, 917 + 33	Berne.....	73	8	1	1	1	1	1	5	0	512, 262	Weir.....	Wood.
27	Hydraulic tunnel.....	71 and	72	16, 921 + 11	Tow-path.....	22	0	0	0	0	0	0	4	0	512, 262	Weir.....	Wood.
28	Hydraulic tunnel.....	71 and	72	16, 921 + 51	Berne.....	22	0	0	0	0	0	0	4	0	512, 262	Weir.....	Wood.

\*Distances taken to centers of weirs.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL.

## TABLE OF AQUEDUCTS.

No	NAME.	Location: between locks.	Continuous stations * from Erie canal junction.	INTERIOR WIDTH.		Number of spans.	TOTAL LENGTH.		Elevation of spillway.	Number of gates.
				Feet.	In.		Feet.	In.		
1	Schuylerville, Fish creek.....	9 and 10	1,479+19	44	0	2	50	0	102.147	6
2	Fort Miller.....	12 and 13	1,702+05	43	6	1	17	0	118.069	2
3	Moses kill.....	14 and 15	1,898+97	40	0	2	74	4	138.140	0
4	Fort Edward.....	14 and 15	2,158+58	50	0	1	20	0	137.695	4

\*Distances taken to centers of aqueducts.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).  
TABLE OF BRIDGES.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of sider- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
1	Junction.....	0 and	3 + 15 H'y & change	Arch.....	Arch.....	Iron.....	120	6	1	12	0			
2	Arch street.....	0 and	19 + 97 Highway.....	Trapesoidal	Whipple.....	Iron.....	97	5	2	19	0			
2a	Cohoes.....	0 and	75 + 28 Highway.....	Whipple.....	Whipple.....	Iron.....	78	5	2	19	0			
3	Willow St., Cohoes.....	2 and	96 + 00 Highway.....	Arch.....	Arch.....	Iron.....	70		1	15	0			
4	Ship St., Cohoes.....	2 and	101 + 08 Highway.....	Trapesoidal	Whipple.....	Iron.....	71	4	2	18		1	4	2
4a	Cedar St., Cohoes.....	2 and	106 + 20 Foot.....	Whipple.....	Whipple.....	Wood.....	67	7				1	4	2
5	Ontario St., Cohoes.....	2 and	121 + 40 Highway.....	Trapesoidal.	Trapesoidal.	Iron.....	80		2	35	4	1	6	6
5a	Mohawk river.....	3 and	{ 124 + 55 Highway and 141 + 62 low-path	Trapesoidal	Trapesoidal	Iron.....	707		2	23	4	1	7	8
6	Fulton St., Waterford.....	4 and	154 + 78 H'y & change	Plate girder	Whipple.....	Wood.....	55	0	1	17	3	1	5	0
7	Eccles, Waterford.....	4 and	169 + 00 Highway.....	Whipple.....	Whipple.....	Wood.....	57		1	13				
8	Burtous, Waterford.....	4 and	193 + 85 Highway.....	Swing.....	Swing.....	Iron.....	114	3	1	15	0			
8a	Side-cut.....	4 and	205 + 29 Tow-path.....	Trapesoidal	Trapesoidal	Iron.....	52	7	1	19	0			
9	Broad St., Waterford.....	4 and	209 + 50 Highway.....	Lift.....	Lift.....	Iron.....	57		1	12	8	2	7	
10	Division St., Waterford.....	4 and	213 + 35 Highway.....	Whipple.....	Whipple.....	Iron.....	65	6	1	14	8			
10a	D. & H. R. R., Waterford.....	4 and	224 + 35 Railroad.....	Plate girder	Plate girder	Wood.....	62	8	1	15	8			
11	Thorne's lane.....	6 and	297 + 04 Highway.....	Whipple.....	Whipple.....	Wood.....	63		1	12	4			
12	Weaver's.....	6 and	319 + 95 Farm.....	Whipple.....	Whipple.....	Wood.....	74	0	1	10	8			
13	Pratt's.....	6 and	337 + 20 Highway.....	Whipple.....	Whipple.....	Wood.....	53	0	1	12	7			
13a	Slade's.....	6 and	351 + 46 Farm.....	Whipple.....	Whipple.....	Wood.....	73	8	1	12	3			
14	Morrill's.....	6 and	361 + 23 Farm.....	Whipple.....	Whipple.....	Wood.....	53		1	12				
15	Wilson's.....	6 and	386 + 34 Highway.....	Whipple.....	Whipple.....	Wood.....	63	7	1	16	7	53		
16	Gleason's.....	6 and	404 + 60 Highway.....	Whipple.....	Whipple.....	Wood.....	58		1	12	8			
17	McDonald.....	6 and	432 + 21 Farm.....	Whipple.....	Whipple.....	Wood.....	69	7	1	15				
18	Flynn's.....	7 and	458 + 94 Farm.....	Whipple.....	Whipple.....	Wood.....	56		1	13	4			
19	Fitzgerald.....	7 and	478 + 49 Highway.....	Whipple.....	Whipple.....	Wood.....	61	6	1	19				
20	Hewitt's.....	7 and	511 + 82 Farm.....	Whipple.....	Whipple.....	Wood.....	66	5	1	14				
21	Brick yard, Mechanville.....	8 and	589 + 62 Highway.....	Whipple.....	Whipple.....	Wood.....	50		1	13				
22	Sear's Mechanville.....	8 and	617 + 59 Highway.....	Whipple.....	Whipple.....	Wood.....	52	2	1	14				
23	South St., Mechanville.....	8 and	628 + 00 Highway.....	Whipple.....	Whipple.....	Wood.....	50		1	15				5

\* Distances taken to centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
 TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).  
 TABLE OF BRIDGES—(Continued).

No.	NAME.	Location: between locks.	Continuous stations* from canal junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAYS.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
23a	D. & H. R. R. Mechanicville.	8 and 9	636 + 16 Railroad		Trapezoidal	Iron	60		2	27	0			
24	Park Ave. Mechanicville.	8 and 9	642 + 41 Highway		Lift	Iron	51		2	19	6			
24a	Burke Ave. Mechanicville.	8 and 9	650 + 32 Street		Plate girder	Iron	62	0		1	19	0	5	0
25	William St. Mechanicville.	8 and 9	656 + 80 Street		Whipple	Iron	51	4	1	18	5			
26	North St. Mechanicville.	8 and 9	662 + 11 Street		Plate girder	Iron	59	9	2	19	0	2	4	8
26a	Fitchburg railroad, M'ville.	8 and 9	675 + 24 Railroad		Lift	Iron	54		1	15				
27	Pulp mill. Mechanicville.	8 and 9	682 + 37 Highway		Whipple	Wood	59	15	1	15				
28	Bea's. Mechanicville.	8 and 9	706 + 49 Highway		Whipple	Wood	59		1	14				
28a	Fitch R. R. Mechanicville.	8 and 9	720 + 40 Railroad		Trapezoidal	Iron	66		1	14	3			
29	Becker's. S. of lock 9.	8 and 9	729 + 00 Farm.		Whipple	Wood	54		1	12				
30	Nolan's. dry dock.	9 and 10	758 + 16 Highway		Whipple	Wood								
31	P. Wetse's. Stillwater	9 and 10	770 + 74 Farm.		Whipple	Wood	61		1	13				
32	P. Wetse's. Stillwater	9 and 10	782 + 40 Farm.		Whipple	Wood	57	10	1	13	0			
33	Lansing's. Stillwater.	9 and 10	789 + 75 Farm.		Whipple	Wood	65		1	14				
34	Lake St. Stillwater.	9 and 10	804 + 67 Highway.		Whipple	Wood	65	3	1	13	0	1	13	0
34a	Lake St. Stillwater.	9 and 10	830 + 71 Foot.		Whipple	Wood	51	0						
35	Bull's. Stillwater.	9 and 10	833 + 98 Highway.		Whipple	Wood	56		1	17				
36	Stratton.	9 and 10	900 + 70 Highway.		Whipple	Wood	60	7	1	13				
37	Conoughtry's.	9 and 10	913 + 50 Farm.		Whipple	Wood	60		1	14				
38	Farnam.	9 and 10	933 + 09 Farm.		Whipple	Wood	61		1	13				
39	Britton's.	9 and 10	944 + 70 Farm.		Whipple	Wood	62		1	13				
40	Bemis Heights.	9 and 10	954 + 25 Highway.		Whipple	Iron	70		1	14	4			
41	Steel's.	9 and 10	976 + 00 Highway.		Whipple	Wood	69		1	17	4			
42	Overacker's.	9 and 10	995 + 11 Farm.		Whipple	Iron	74	5	1	12	0			
43	Cheever's.	9 and 10	1,006 + 00 Farm.		Whipple	Iron	74		1	12				
44	Holmes.	9 and 10	1,039 + 18 Farm.		Whipple	Wood	81		1	14				
45	Curtiss.	9 and 10	1,057 + 88 Farm.		Whipple	Wood	62	4	1	13				
46	Larrington's.	9 and 10	1,067 + 48 Farm.		Whipple	Wood	94		1	13				

47	Patterson's, Wilbur's Basin.	9 and 10	1,079	70 Highway	Whipple	Wood	59	3	11	3
48	Cotton's	9 and 10	1,098	45 Farm	Whipple	Wood	61	11	11	3
49	Enagn's	9 and 10	1,115	48 Farm	Whipple	Wood	53	3	11	13
50	Tompkin's	9 and 10	1,127	28 Farm	Whipple	Wood	60	11	13	3
51	Coleman's	9 and 10	1,156	41 Highway	Whipple	Wood	58	8	11	13
52	Sear's	9 and 10	1,168	41 Farm	Whipple	Wood	62	11	11	7
53	Carr's	9 and 10	1,191	76 Highway	Whipple	Wood	63	5	12	7
54	Salisbury's	9 and 10	1,206	55 Highway	Whipple	Wood	63	5	16	0
55	Holmes	9 and 10	1,248	62 Farm	Whipple	Wood	54	3	12	0
56	Hudson Valley R. R.	9 and 10	1,274	39 Farm	Whipple	Iron	117	9	14	0
57	Cotello, Coville	9 and 10	1,294	61 Foot	Suspension	Wood	46	5	11	11
58	Cotello	9 and 10	1,306	19 Farm	Whipple	Wood	70	2	5	11
59	Cramers	9 and 10	1,315	68 Foot	Suspension	Wood	63	2	11	6
60	Wilcox-Searls	9 and 10	1,328	47 Farm	Whipple	Wood	74	11	6	6
61	Searls	9 and 10	1,338	27 Farm	Whipple	Wood	50	5	11	12
62	Shades-Hewett	9 and 10	1,384	75 Farm	Whipple	Wood	68	5	12	12
63	Crane's	9 and 10	1,396	45 Farm	Whipple	Wood	54	0	12	6
64	Stubbs-Hatway	9 and 10	1,437	62 Farm	Whipple	Wood	51	11	12	6
65	Stover	9 and 10	1,476	30 Farm	Whipple	Wood	64	3	11	12
66	Schenyerville, Ferry St.	9 and 10	1,486	70 Highway	Arch	Iron	64	2	12	7
67	Schenyerville, Saratoga St.	9 and 10	1,494	37 Highway	Trapesoidal	Iron	83	6	18	4
68	Bulard's	9 and 10	1,544	34 Highway	Springer	Iron	74	1	18	4
69	Towpath	9 and 10	1,553	25 Highway	Whipple	Wood	42	6	12	13
70	Lang's	9 and 10	1,568	48 Farm	Whipple	Wood	64	4	12	0
71	Saratoga change	9 and 10	1,576	94 H'w'y & change	Whipple	Wood	63	4	12	0
72	Towpath	10 and 11	1,589	66 Tow-path	Whipple	Wood	72	0	16	0
73	Northumberland	10 and 11	1,605	13 Tow-path	Whipple	Wood	58	0	16	0
74	Lower	10 and 11	1,611	40 Highway	Whipple	Wood	59	0	13	0
75	Taylor	11 and 12	1,637	56 Farm	Whipple	Wood	55	7	11	6
76	Tabor	11 and 12	1,661	10 Farm	Whipple	Wood	67	11	12	6
77	Baker's	11 and 12	1,675	99 Farm	Whipple	Wood	57	12	12	6
78	Union Village	12 and 13	1,695	54 Highway	Whipple	Wood	62	3	12	6
79	Fort Miller	12 and 13	1,703	89 Highway	Whipple	Wood	58	2	12	6
80	Fort Miller, lower change	12 and 13	1,724	38 H'w'y & change	Whipple	Wood	55	11	12	6
81	Fort Miller, Nichols	12 and 13	1,742	50 Highway	Whipple	Wood	56	0	10	9
82	Fort Miller, upper change	13 and 14	1,761	25 H'w'y & change	Whipple	Wood	53	4	10	4
83	Pearse's	13 and 14	1,784	35 Farm	Arch	Iron	58	0	12	8
84	Payne's	13 and 14	1,801	79 Farm	Whipple	Wood	50	3	11	11
85	Galusha's	13 and 14	1,820	100 Highway	Whipple	Wood	55	8	12	6
86	Bristol	13 and 14	1,837	65 Farm	Whipple	Wood	55	4	12	6
87	Crocker's	13 and 14	1,855	62 Farm	Whipple	Wood	55	13	12	6
88	Linendoll's	13 and 14	1,877	12 Highway	Whipple	Wood	56	0	15	16
89	L & V Railroad	13 and 14	1,903	76 Highway	Trapesoidal	Iron	72	7	15	7
90	Mott's	14 and 15	1,917	17 Highway	Whipple	Wood	62	1	15	7
91	Mott's	14 and 15	1,948	76 Highway	Whipple	Wood	59	1	12	6
92	Griffin's	14 and 15	1,948	76 Highway	Whipple	Wood	59	1	13	6

\*Distances taken to centers of tow-path abutments.



TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).  
TABLE OF BRIDGES—(Concluded).

No.	NAME.	Location: between locks.	Continuous stations* from Errie canal junction.	Class.	Plan.	Material.	Clear Span.		Number of road- ways.	Width of Road- ways.		Number of side- walks.	Width of Side- walks.	
							Feet.	In.		Feet.	In.		Feet.	In.
86	Lander's.....	14 and 15	1,958 + 73 Highway.	Whipple	Wood	56	1		1	15		8		
86a	Turner-Satterlee.....	14 and 15	1,966 + 20 Foot.	Whipple	Wood	61							5	0
87	Bentley's.....	14 and 15	1,975 + 01 Foot.	Whipple	Wood	61	4			12				
88	Bentley's.....	14 and 15	2,004 + 59 Highway.	Whipple	Wood	68	0		1	15		6		
89	Bentley's.....	14 and 15	2,014 + 11 Highway.	Whipple	Wood	62	0		1	12		6		
90	Bentley's.....	14 and 15	2,019 + 09 Highway.	Whipple	Wood	54	7		1	15		5		
91	Brayman's.....	14 and 15	2,045 + 87 Highway.	Whipple	Wood	58	1		1	12		1		
91a	Hudson Valley R. R.....	14 and 15	2,055 + 12 Trolley.	Trapezoidal	Iron									
92	Smith's.....	14 and 15	2,059 + 12 Farm.	Whipple	Wood	50	0		1	12		0		
93	Durkee's.....	14 and 15	2,081 + 82 Farm.	Whipple	Wood	55	2		1	11		11		
94	Potter's.....	14 and 15	2,135 + 29 Highway.	Whipple	Wood	80	4		1	14		0		
95	Stickney's, Fort Edward.....	14 and 15	2,153 + 40 Change & street	Whipple	Wood	78	0		2	10			6	4
96	Argyle St., Fort Edward.....	14 and 15	2,167 + 90 Street	Arch	Iron	79	4		2	16				
97	D. & H. Railroad.....	14 and 15	2,173 + 10 Railroad	Trapezoidal	Iron	100	10		2	26		0		
97a	D. & H. Railroad.....	14 and 15	2,180 + 40 Street	Arch	Iron	59	2		2	19			6	
98	East St., Fort Edward.....	14 and 15	2,185 + 60 Highway.	Plate girder	Iron	71	0		1	15		0		
98a	D. & H. R. R., Glens Falls.....	15 and 16	2,190 + 98 Highway.	Whipple	Wood	76	0							
99	Case, Fort Edward.....	15 and 16	2,202 + 38 H'wy & change	Arch	Iron	79	8		1	13				
100	Glens Falls feeder.....	15 and 16	2,315 + 03 Farm.	Trapezoidal	Iron	72	0		1	11		0		
101	Coleman's.....	15 and 16	2,352 + 20 Highway.	Whipple	Wood	52	0		1	12		0		
102	Dunham's Basin.....	15 and 16	2,517 + 09 Farm.	Whipple	Wood	50	10		1	11				
103	Rogers.....	15 and 16	2,528 + 37 Farm.	Whipple	Wood	56	0		1	15		0		
104	Newton's.....	15 and 16	2,594 + 25 Highway.	Whipple	Wood	56	10		1	14				
105	Smith's Basin.....	15 and 16	2,616 + 74 Highway.	Whipple	Wood	55	7		1	14		6		
106	Harris.....	15 and 16	2,644 + 37 Highway.	Whipple	Wood	62	9		1	12				
107	Owen's.....	15 and 16	2,658 + 25 Farm.	Whipple	Wood	57	1		1	11				
108	Griffin's.....	15 and 16	2,668 + 57 Farm.	Whipple	Wood	51	6		1	11				
109	Bailey.....	15 and 16	2,695 + 36 Highway.	Trapezoidal	Iron	90	0		1	15		0		
110	Baldwin's.....	15 and 16	2,717 + 23 Highway.	Whipple	Wood	51			1	11				
111	Coleman's.....	15 and 16		Whipple	Wood	51			1	11				

112	Brown's	15 and 16	2,743 + 50	Farm	Whipple	Wood	58	2	1	12	0	.....	.....
113	Wait's	15 and 16	2,766 + 91	Farm	Whipple	Wood	59	4	1	12	.....	.....	
114	Proulx	15 and 16	2,775 + 83	Farm	Whipple	Wood	62	.....	.....	12	.....	.....	
114a	Ingalsbee's, Fort Ann	15 and 16	2,800 + 36	Foot	Suspension	Wood	78	0	.....	.....	.....	6	
115	Fort Ann	17 and 18	2,807 + 16	Highway	Trapesoidal	Iron	78	4	2	16	.....	.....	
115a	D. & H. R. R.	18 and 19	2,818 + 12	Railroad	Trapesoidal	Iron	104	.....	.....	30	0	.....	
116	Canal	18 and 19	2,821 + 59	Change	Whipple	Wood	85	10	1	12	.....	.....	
117	Narrows	18 and 19	2,898 + 76	Highway	Whipple	Wood	83	0	1	12	.....	.....	
117a	Dewey's	18 and 19	2,949 + 64	Highway	Trapesoidal	Iron	70	6	1	13	.....	.....	
118	Tow-path	19 and 20	3,003 + 62	Tow-path	Stringer	Wood	33	.....	.....	8	.....	.....	
118a	Comstock's	19 and 20	3,033 + 29	Highway	Trapesoidal	Iron	72	8	2	19	.....	.....	
118b	Granville	19 and 20	3,080 + 53	Highway	Trapesoidal	Iron	68	7	1	13	.....	.....	
119	Smith's	19 and 20	3,104 + 42	Tow-path	Stringer	Wood	49	.....	.....	12	.....	.....	
120	Lock 20	19 and 20	3,111 + 08	Farm	Whipple	Wood	88	10	1	12	.....	.....	
121	Fuller	20 and 21	3,125 + 21	Farm	Whipple	Wood	71	2	1	11	.....	.....	
122	A. Kinner's	20 and 21	3,143 + 79	Change	Whipple	Wood	55	2	1	12	.....	.....	
123	Kinner's	20 and 21	3,150 + 80	Highway	Whipple	Wood	61	.....	.....	12	.....	.....	
123a	D. & H. Railroad	20 and 21	3,162 + 87	Farm	Whipple	Wood	63	6	1	11	.....	.....	
124	Johnson's	20 and 21	3,167 + 09	Railroad	Trapesoidal	Iron	132	0	2	30	0	.....	
125	Johnson's	20 and 21	3,178 + 97	Farm	Whipple	Wood	55	2	1	11	.....	.....	
126	Johnson's	20 and 21	3,190 + 25	Farm	Whipple	Wood	61	13	1	16	.....	.....	
127	Virgil-Cooper	20 and 21	3,220 + 95	Highway	Arch	Iron	66	3	1	11	.....	.....	
128	Murray	20 and 21	3,254 + 76	Highway	Whipple	Wood	63	10	1	13	.....	.....	
129	Martin's	20 and 21	3,283 + 21	Farm	Whipple	Wood	62	7	1	12	.....	.....	
130	Johnson's	20 and 21	3,295 + 21	Farm	Whipple	Wood	57	.....	.....	11	.....	.....	
131	Dayton	20 and 21	3,363 + 37	Farm	Whipple	Wood	62	8	1	12	.....	.....	
131a	D. & H. Railroad	20 and 21	3,373 + 83	Railroad	Trapesoidal	Iron	96	6	2	34	4	.....	
131b	D. & H. R. Rutland	20 and 21	3,400 + 52	Railroad	Trapesoidal	Iron	90	9	2	13	6	.....	
132	Boardman St., Whitehall	20 and 21	3,405 + 93	Street	Whipple	Wood	68	3	2	19	.....	.....	
133	Canal, Whitehall	20 and 21	3,420 + 27	Change	Whipple	Wood	102	4	1	13	.....	.....	
134	Saunders, Whitehall	20 and 21	3,428 + 33	Street	Arch	Iron	82	5	2	20	.....	.....	
134a	Canal and Wood creek	20 and 21	3,432 + 01	Foot	Trapesoidal	Iron	57	9	.....	10	.....	.....	
135	Clinton Ave.	22 and 23	3,427 + 24	Street	Arch	Iron	89	6	2	20	.....	.....	
1	Fourth St.	4 and 5	205 + 52	Street	Plate girder	Iron	52	8	1	18	0	.....	

\*Distances taken from centers of tow-path abutments.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).

TABLE OF CULVERTS.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.
						LENGTH.		SPAN.		HEIGHT.		
						Feet.	In.	Feet.	In.	Feet.	In.	
1	Ax factory.....	0 and 1	42+90 Box.....		1	97	0	5	0	5	0	0 Stone.
2	Dotter's.....	2 and 3	84+00 Arch.....		1	200	0	6	0	3	0	0 Stone.
3	Cemetery, Waterford.....	4 and 4	193+46 Arch.....		1	57	2	6	0	7	3	0 Stone.
4	Weigh-lock, Waterford.....	4 and 5	219+35 Arch.....		1	110	0	8	0	8	0	0 Stone.
5	Thorne's lane.....	6 and 7	299+70 Box.....		1	109	6	4	0	4	0	0 Stone.
6	Wilson's.....	6 and 7	390+58 Box.....		1	127	0	10	0	5	0	0 Stone.
7	Flynn's.....	6 and 7	439+15 Arch.....		1	119	6	11	0	8	0	0 Stone.
8	Ensign brook.....	8 and 9	546+25 Round.....		1	588	0	.....	10	.....	10	0 Iron pipe.
9	Brick yard, Mechanicville.....	8 and 9	584+22 Box.....		2	107	4	3	0	4	0	0 Stone.
10	Knitting mill, Mechanicville.....	8 and 9	654+75 Arch.....		2	101	9	16	0	.....	.....	0 Stone.
11	Pulp mill, Mechanicville.....	8 and 9	678+50 Box.....		1	108	0	3	0	4	0	0 Stone.
12	Dry dock.....	9 and 10	755+97 Box.....		1	250	0	1	4	1	8	0 Stone.
13	Salisbury's.....	9 and 10	1,204+70 Arch.....		1	157	0	8	0	4	0	0 Stone.
14	Coville.....	9 and 10	1,323+10 Arch.....		1	102	0	8	0	4	0	0 Stone.
15	Canal drain.....	9 and 10	1,553+40 Arch.....		1	59	0	2	0	4	0	0 Stone.
16	Billing's, Tow-path.....	10 and 11	1,591+25 Box.....		1	181	5	8	0	3	0	0 Stone.
17	Bassett, Fort Miller.....	12 and 13	1,715+25 Box.....		1	108	5	3	0	3	0	0 Stone.
17a	Sheldon's, Fort Miller.....	12 and 13	1,737+87 Arch.....		1	266	7	6	0	3	0	0 Stone.
18	Lindendoll.....	14 and 15	1,923+70 Round.....		1	192	0	1	8	0	8	0 Iron pipe.
19	Motte-Sanders.....	14 and 15	1,933+20 Arch.....		1	151	0	7	0	2	0	0 Stone.
20	Lander's.....	14 and 15	1,954+70 Arch.....		1	130	0	5	0	2	0	0 Stone.
21	Belle-Harris.....	14 and 15	2,015+70 Arch.....		1	132	0	8	0	2	0	0 Stone.
22	Brayman.....	14 and 15	2,046+35 Round.....		2	89	0	1	6	1	1	0 Iron pipe.
23	Smith.....	14 and 15	2,052+70 Box.....		1	85	0	1	6	1	1	0 Stone.
24	Fort Ann.....	15 and 16	2,750+03 Box.....		1	143	0	.....	08	.....	08	0 Wood.
25	Whitehall.....	20 and 21	3,422+57 Round.....		1	139	9	3	0	3	0	0 Iron pipe.
26	Whitehall, sewer, private.....	20 and 21	3,430+44 Round.....		1	130	0	3	0	3	0	0 Vitrified pipe.

\*Distances taken to centers of culverts.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).

TABLE OF DAMS.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	LENGTH.		MEAN HEIGHT.		Material in dam.	Material in apron.	Material in bulkhead.	Number of gates.	Curved or straight.	Elevation of crest.
				Feet.	In.	Feet.	In.						
1	Troy, Hudson river.....	2 and 3	Off line of canal	1,100	0	19	0	Wood.....	Wood.....	Wood.....	Sloop-lock.	Straight....	13.35
2	Cohoes.....	3 and 4	129+48	1,611	4	12	5	Stone & steel.	Steel.....	Wood.....	.....	Straight....	48.93
3	Northumberland.....	10 and 11	1,586+63	846	7	9	9	Stone.....	Stone crib.	Wood.....	.....	Straight....	102.53
4	Glens Falls feeder.....	15 and 16	On feeder.....	618	0	14	0	Wood & stone	Stone crib.	Wood.....	.....	Straight....	280.9

\*Distances taken to stations on tow-path opposite which dams are located.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).

TABLE OF LOCKS.

No.	NAME.	Continuous stations* from Erie canal junction.	Single or double lock.	Lift, (computed from lower miter-sill elevations). Feet.	Direction of lift or descent.	Elevation of lower miter-sill.	Observed elevation of mean water-surface, 1905.†
1	Cohoes.....	77+30 Single.	Single.	11.608	Lift, north.....	18.207	26.28
2	Cohoes.....	83+27 Single.	Single.	11.479	Lift, north.....	29.815	37.04
3	Mohawk river, So. guard.	125+52 Single.	Single.	.....	Lift, north.....	41.294	49.74
4	Mohawk river, No. guard.	147+42 Single.	Single.	.....	Lift, north.....	.....	49.91
5	North of Waterford.....	286+96 Single.	Single.	14.170	Lift, north.....	41.160	49.70
6	North of Waterford.....	282+97 Single.	Single.	11.140	Lift, north.....	55.330	61.70
7	Flynn's.....	442+68 Single.	Single.	8.950	Lift, north.....	66.470	75.60
8	Hewitt's.....	514+44 Single.	Single.	9.870	Lift, north.....	75.420	83.10
9	Becker's.....	731+75 Single.	Single.	9.170	Lift, north.....	85.290	98.20
10	Northumberland, So. guard.	1,588+62 Single.	Single.	0.360	Descent, north.....	94.460	102.28
11	Saratoga.....	1,613+08 Single.	Single.	10.080	Lift, north.....	94.100	102.53
12	Passett.....	1,698+55 Single.	Single.	9.800	Lift, north.....	104.180	111.21
13	Fort Miller.....	1,753+23 Single.	Single.	9.530	Lift, north.....	113.780	119.30
14	Moses hill.....	1,895+35 Single.	Single.	9.393	Lift, north.....	123.310	129.32
15	Fort Edward, summit level.	2,186+96 Single.	Single.	7.987	Lift, north.....	132.703	138.40
16	Fort Ann, canal bottom, summit level.	2,804+37 Single.	Single.	8.254	Descent, north.....	140.690	.....
17	Combined, Fort Ann.....	2,805+48 Single.	Single.	8.216	Descent, north.....	132.336	.....
18	Brigg's, Fort Ann.....	2,814+96 Single.	Single.	7.210	Descent, north.....	124.120	131.61
19	Parish, Wood creek.....	2,985+50 Single.	Single.	2.020	Descent, north.....	116.910	126.00
20	Wood creek, guard.....	3,143+23 Single.	Single.	0.380	Descent, north.....	114.890	122.00
21	Combined, Whitehall.....	3,435+79 Single.	Single.	9.915	Descent, north.....	114.510	122.00
22	Combined, Whitehall.....	3,436+89 Single.	Single.	9.150	Descent, north.....	104.595	.....
23	Combined, Whitehall.....	3,438+00 Single.	Single.	9.840	Descent, north.....	95.445	.....
1	Sloop-lock, Troy dam.	Off line of canal.	Single.	9.0	Descent, north.....	85.605	104.00
1	Side-cut, combined, Waterford.	.....	.....	.....	Lift, north.....	-3.330	4.98
1	Hudson river.....	205+52 Single.	Single.	10.780	Lift, west.....	8.050	15.36
2	Hudson river.....	205+52 Single.	Single.	10.810	Lift, west.....	18.830	37.85
3	Hudson river.....	205+52 Single.	Single.	11.520	Lift, west.....	29.640	49.30
1	Weigh-lock, Waterford.....	219+00 Single.	Single.	.....	.....	.....	.....

\*Distances taken to upper hollow quoins.

†Taken generally by adding 0.66 feet (original height of sill above lining-plank, before repairs) to elevation of lock-floor.

‡Taken generally at the stain left on walls by water-surface.

§Elevation of dam.

||Low water.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Continued).

TABLE OF STREAM RECEIVERS.

No.	NAME.	Location between locks.	Continuous stations* from Erie canal junction.	LENGTH.		HEIGHT.		Side of canal.	Materia.
				Feet.	In.	Feet.	In.		
1	Pratt.....	6 and 7	338+30	40	10	9	0	Berna....	Stone.
2	Morrell.....	6 and 7	363+50	40	10	9	0	Berna....	Stone.
3	McDonald.....	6 and 7	423+00	41	0	9	0	Berna....	Stone.
4	Taylor's.....	15 and 16	2,228+96	40	0	9	0	Berna....	Stone.
5	Dunham creek.....	15 and 16	2,316+30	50	0	9	0	Berna....	Stone.

\*Distances taken to centers of receivers.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE CHAMPLAIN CANAL—(Concluded).

TABLE OF WASTE-WEIRS AND SPILLWAYS.

No.	NAME.	Location: between locks.	Continuous stations* from canal junction.	Side of canal.	LENGTH OF SPILLWAY.		Number of gates.	LENGTH OF GATE.		HEIGHT OF GATE.		Eleva- tion of spill- way.	Spillway or weir.	Material in bulk- head.
					Feet.	In.		Feet.	In.	Feet.	In.			
1	Ax factory.....	0 and 1	42 + 93 Tow-path		39	0	1					25.530 Spillway		Wood.
2	Burton's.....	4 and 5	195 + 45 Tow-path		60	3	5					48.760 Both		Wood.
3	Knitting mill, Waterford.	4 and 5	217 + 68 Tow-path		15	4	1					49.040 Weir		Steel.
4	Lamb.....	5 and 6	272 + 38 Berme.....		60	0	3					61.370 Spillway		Stone.
5	Flynn's.....	6 and 7	439 + 14 Tow-path		12	3	1					76.716 Weir		Steel.
6	Fitzgerald's.....	7 and 8	491 + 02 Tow-path		32	0	3					83.492 Both		Wood.
7	Mechanicville.....	8 and 9	696 + 40 Tow-path		102	3	3					93.211 Both		Steel.
8	Mechanicville.....	9 and 10	797 + 94 Tow-path		102	3	3					101.678 Both		Steel.
9	Leasing's-Stillwater.....	9 and 10	954 + 85 Tow-path		46		2					101.611 Both		Wood.
10	Bernia Heights.....	9 and 10	1,071 + 56 Tow-path		114	7	4					101.848 Both		Steel.
11	Wilbur's Basin.....	9 and 10	1,169 + 80 Tow-path		24	7	2					101.869 Weir		Steel.
12	Coville.....	9 and 10	1,313 + 21 Tow-path		13	6	1					101.110 Weir		Wood.
13	Bullard's bend.....	9 and 10	1,572 + 45 Tow-path		12	0	1					102.492 Weir		Wood.
14	Tubb's.....	11 and 12	1,666 + 97 Tow-path		16	4	1					111.043 Weir		Wood.
15	Bristol's.....	13 and 14	1,848 + 51 Tow-path		12	0	1					128.110 Weir		Wood.
16	Satterlee's.....	14 and 15	1,965 + 57 Tow-path		14		1					137.931 Weir		Wood.
16a	Lock No. 15, Ft. Edward.	15 and 16	2,185 + 17 Berme.....		7	1	1					148.100 Weir		Wood.
17	O'Brien's Basin.....	15 and 16	2,240 + 94 Tow-path		59	8	3					147.881 Spillway		Stone.
18	Dunham's Basin.....	15 and 16	2,349 + 69 Tow-path		47	9	2					147.881 Both		Stone.
19	Minton's.....	15 and 16	2,548 + 33 Tow-path		100	3	5					147.883 Spillway		Wood.
20	Smith's Basin.....	15 and 16	2,595 + 05 Tow-path		16	3	1					146.808 Spillway		Wood.
21	Empire's.....	15 and 16	2,678 + 21 Tow-path		31	10	2					147.409 Spillway		Wood.
22	Parish Lock, No. 19.....	18 and 19	2,982 + 53 Berme.....		121	7	2					125.338 Spillway		Wood.
23	Tree dam.....	19 and 20	3,122 + 63 Berme.....		123	9	1					121.684 Both		Wood.
24	Fullers.....	19 and 20	3,126 + 20 Berme.....		46	5	2					121.684 Both		Wood.
25	Jackson's.....	19 and 20	3,140 + 26 Berme.....		75	6	3					121.770 Both		Wood.
26	Eastman's.....	20 and 21	3,293 + 16 Tow-path		67	5	3					121.770 Both		Wood.
27	Manuville.....	20 and 21	3,389 + 34 Tow-path		12	3	1					121.515 Weir		Steel.

\*Distances taken to centers of weirs.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

TABLES OF STRUCTURES ON THE OSWEGO CANAL.

TABLE OF AQUEDUCTS.

No.	NAME.	Location: between locks.	Continuous station* from first canal junction.	INTERIOR WIDTH.		Number of spans.	TOTAL LENGTH.		Elevation of spillway.	Flash boards.	Number of gates.
				Feet.	In.		Feet.	In.			
1	Waterhouse creek.....	10 and 11	1,482+99	50	0	1	25	0	318.70	None.....	.....

\*Distance taken to center of aqueduct.



## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE OSWEGO CANAL—(Continued).

TABLE OF BRIDGES.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	Class.	Plan.	Material.	CLEAR SPAN.		Number of road- ways.	WIDTH OF ROAD- WAY.		Number of side- walks.	WIDTH OF SIDE- WALKS.	
							Feet.	In.		Feet.	In.		Feet.	In.
1	James St., Syracuse	0 and	2+39 Street		Trapezoidal	Iron	73	0	2	22	0	2	9	0
14	Hent & Power Co., Syracuse	0 and	2+77 Pipe		Trapezoidal	Iron	73	0	1	4	0			
2	Willow St., Syracuse	0 and	5+91 Street		Lift	Iron	60	5	1	22	8	2	6	0
2a	West Shore R. R., Syracuse	0 and	11+13 Railroad		Lift	Iron								
24	Salina St., Syracuse	0 and	13+42 Foot		Girder	Iron	97	8				1	6	9
3	Salina St., Syracuse	0 and	13+91 Street		Lift	Iron	79	4	1	25	6	2	6	4
3a	Butterout St., Syracuse	0 and	24+85 Street		Lift	Iron	60	0	1	21	2	2	5	4
4	Division St., Syracuse	0 and	35+12 Street		Whipple arch	Iron	71	7	1	19	0	2	6	2
5	Bear St., Syracuse	0 and	69+12 Street		Whipple arch	Iron	80	1	1	18	1	1	6	7
54	Haskin's race, Syracuse	0 and	80+16 Tow-path		Stringer	Wood	65	0	1	14	0			
6	Salina St., Syracuse	0 and	88+30 Street		Lift	Iron	62	0	1	21	0			
7	Park St., Syracuse	1 and	93+12 Street		Whipple arch	Iron	72	0	1	18	11	2	4	2
8	Salina, Syracuse	3 and	111+66 Change		Trapezoidal	Wood	78	7	1	14	6			
8a	N. Y. C. & H. R. R.	3 and	115+04 Railroad		Trapezoidal	Iron	128	8	2	15	6			
9	Green Point	3 and	133+02 Pipe		Trapezoidal	Iron	72	1	1	4	6			
9a	Green Point	3 and	133+22 Highway		Whipple arch	Iron	72	1	1	14	10			
9a	Green Point	3 and	133+30 St. Railroad & change		Whipple arch	Iron	72	8	2	12	8			
9b	R. W. & O. R. R.	3 and	198+15 Railroad		Trapezoidal	Iron	139	7	1	11	6			
10	Liverpool-Sycomore	3 and	260+46 Street		Whipple arch	Iron	74	0	1	17	0			
11	Willow Bay	3 and	366+74 Highway and change		Tubular trapezoidal	Iron	82	8	1	15	0			
11a	Approach to Bridge 11.	3 and	366+72 Highway		Trapezoidal	Wood	82	4	1	15	4			
11b	Outlet bridge	3 and	366+97 Highway		Whipple arch	Iron	82	8	1	15	0			
12	Cold Spring	5 and	418+30 Highway		Baltimore truss	Iron	287	0	1	19	8			
13	Belgium	5 and	673+11 Highway		3 spans Whipple arch	Iron	107	8	1	17	10			

[illegible]

\*Distances taken to centers of tow-path abutments.

\*Distances taken to centers of tow-path abutments.

**\*Distance**

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE OSWEGO CANAL—(Continued).

TABLE OF CULVERTS.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	Plan.	Number of openings.	DIMENSIONS OF OPENINGS.						Material.
						LENGTH.		SPAN.		HEIGHT.		
						Feet.	In.	Feet.	In.	Feet.	In.	
1	Bear Trap creek.....	3 and 5	118 + 10 Composite.....		3	108	0	8	0	5	4	Wood.
2	Bloody brook.....	3 and 5	230 + 88 Pipe.....		5	135	6	4	0	4	0	Iron.
3	Saw Mill creek.....	5	315 + 94 Composite.....		5	130	5	4	0	2	0	Wood.
4	Brandy brook.....	5 and 6	934 + 23 Composite.....		3	131	0	4	0	2	0	Wood.
4½	.....	5 and 6	984 + 55 Composite.....		1	136	5	3	...	2	...	Wood.
4½	Race to mills.....	5 and 17	1,987 + 92 Composite.....		3	92	0	6	0	8	0	Wood.
5	Race spillway to river.....	17 and 18	1,998 + 09 Arch.....		3	107	0	8	0	8	0	Stone.

\*Distances taken to centers of culverts.

## TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).

## TABLES OF STRUCTURES ON THE OSWEGO CANAL—(Continued).

TABLE OF DAMS.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	LENGTH.		HEIGHT.		Material in dam.	Material in bulk- head.	Material in apron.	Number of gates.	Curved or straight.	ELEVATIONS.	
				Feet.	In.	Feet.	In.						Crest.	Flash boards.
1	Phoenix	5 and 6	902+85	437	0	8		3 Stone	Iron	Wood and stone	22	Straight	359.26	360.4
2	Oswego Falls	7 and 8	1,401+76	405	0	5		7 Stone	Iron	Wood	35	Straight	347.78	None.
3	Fulton	8 and 9	1,437+15	508	4	17		10 Stone	Wood	Wood	18	Straight	331.85	None.
4	Battle Island	11 and 12	1,623+76	662	0	8		6 Stone	Iron	Steel and wood	10	Straight	308.5	None.
5	Minetto	12 and 13	1,780+08	445	0	7		6 Stone	Iron	Wood	9	Straight	297.3	None.
6	High	15 and 16	1,902+58	340	0	10		0 Stone	Iron	Wood	7	Straight	282.00	None.
7	Oswego	16 and 17	1,973+16	516	0	10		0 Stone	Iron	Stone	25	Curved	266.10	None.

\*Distances taken to top lines of spillways.

TABLES OF EXISTING STRUCTURES ON CANALS—(Continued).  
TABLES OF STRUCTURES ON THE OSWEGO CANAL—(Continued).

TABLE OF LOCKS.

No.	NAME.	Continuous stations* from Erie canal junction.	Single or double lock.	Lengthened— at head or foot.	Lift (computed from lower miter-sill elevations), Feet.	Direction of lift or descent.	Elevation of lower miter-sill.	Observed elevation of main water surface, 1903.†
1	Syracuse.	89 + 29 Single		Not lengthened	11.126 Descent, north.		383 617	391 72
2	Syracuse.	96 + 65 Single		Not lengthened	11.039 Descent, north.		372 578	380 31
3	Syracuse.	102 + 89 Single		Not lengthened	10.166 Descent, north.		362 412	369 95
4	Syracuse, Salina side-cut.	102 + 89 Single		Not lengthened				
5	Mud lock.	391 + 38 Single		Head	9.752 Descent, north.		352 690	362 50
6	Phoenix, guard-lock.	899 + 08 Single		Foot	0.019		352 641	360 530
7	Hinmanville.	1 079 + 12 Single		Head	7.112 Descent, north.		345 529	353 780
8	Morsemans.	1 139 + 90 Single		Not lengthened	0.194		345 335	353 697
9	Fulton, guard-lock.	1 203 + 92 Single		Head	5.878 Descent, north.		339 457	345 160
10	Fulton.	1 391 + 33 Single		Head	0.092		339 365	345 6
11	Fulton.	1 416 + 23 Single		Foot	10.903 Descent, north.		328 462	336 5
12	Fulton.	1 446 + 48 Single		Foot	7.349 Descent, north.		321 113	329 2
13	Fulton.	1 454 + 12 Single		Foot	9.081 Descent, north.		312 032	320 0
14	Battle Island, guard-lock.	1 528 + 20 Single		Head	11.529 Descent, north.		300 503	308 5
15	Minetto.	1 621 + 82 Single		Head	11.131 Descent, north.		300 479	307 759
16	Minetto.	1 745 + 73 Single		Head	5.645 Descent, north.		289 348	299 886
17	Oswego, guard-lock.	1 787 + 18 Single		Not lengthened	9.586 Descent, north.		283 703	290 660
18	Oswego, guard-lock.	1 846 + 58 Single		Not lengthened	5.737 Descent, north.		274 117	282 0
19	Oswego, guard-lock.	1 902 + 52 Single		Not lengthened	7.833 Descent, north.		268 390	276 5
20	Oswego, guard-lock.	1 922 + 51 Single		Not lengthened	1.169		260 547	268 0
21	Oswego, guard-lock.	1 976 + 27 Single		Not lengthened	10.008 Descent, north.		259 378	267 6
22	Oswego harbor.	1 991 + 99 Single		Foot	12.371 Descent, north.		249 370	257 3
23	Oswego harbor.	2 005 + 96 Single		Foot			234.999	244.4

\*Distances taken to upper hollow quoins. †Taken generally by adding 0.66 ft. (original height of sill above lining-plank, before repairs) to elevation of lock-floor. ‡Taken generally at the stain left on walls by water-surface. §No water; canal filled. ||Lock No. 18 was deepened 2 feet during the 1896 improvement; lift computed after adding 2 feet to elevation of present miter-sill. ¶Extreme low water in Lake Ontario.

TABLES OF EXISTING STRUCTURES ON CANALS—(Concluded).  
TABLES OF STRUCTURES ON THE OSWEGO CANAL—(Concluded).

TABLE OF WASTE-WEIRS.

No.	NAME.	Location: between locks.	Continuous stations* from Erie canal junction.	Side of canal.	LENGTH OF SPILLWAY.		Number of spill- ways.	LENGTH OF GATE.		HEIGHT OF GATE.		Eleva- tion of spill- way.	Spillway or weir.	Material in bulk- head.
					Feet.	In.		Feet.	In.	Feet.	In.			
1	Haskin's.....	0 and 1	80 + 16	Tow-path.	62	6	1					401.434	Spillway....	Stone.
2	.....	2 and 3	99 + 10	Berne.....	15	10	1					380.069	Spillway....	Wood.
3	Bear Trap.....	3 and 5	118 + 10	Berne.....	42	5	1	4		2	6	369.526	Spillway....	Stone.
4	Mud lock.....	3 and 5	390 + 59	Berne.....	6	0	3	6	0			369.839	Spillway....	Wood.
5	.....	6 and 7	1,188 + 58	Berne.....	14	9	1	6	2			352.767	Spillway....	Wood.
6	.....	7 and 8	1,409 + 77	Berne.....	20	9	1					346.00	Spillway....	Wood.
7	.....	8 and 9	1,424 + 58	Berne.....	17	6	1					335.092	Spillway....	Wood.
7 <sup>a</sup>	.....	9 and 10	1,453 + 78	Berne.....	22	2	1					326.242	Spillway....	Wood.
8	.....	13 and 14	1,837 + 48	Berne.....	14	10	1					289.150	Spillway....	Wood.
8	.....	15 and 16	1,915 + 93	Berne.....	11	2	1					275.397	Spillway....	Wood.
9	.....	16 and 17	1,989 + 35	Berne.....	103	6	1					267.20	Spillway....	Stone.
9 <sup>1</sup>	.....	17 and 18	2,003 + 76	Berne.....	103	0	1					256.90	Spillway....	Stone.
10	.....													

\*Distances taken to centers of weirs.

†Flash boards—1½ ft. higher.

## CHAPTER II.

### LISTS OF MEN CONNECTED WITH CANAL ADMINISTRATION AND CONSTRUCTION.

Canal Commissioners—Members of the Canal Board—Commissioners of the Canal Fund—  
Second Deputy Comptrollers, Chief Clerks and Auditors—Members of the Board of  
Appraisers the Board of Claims, and the Court of Claims—Superintendents  
of Public Works—Deputy Superintendents of Public Works—Assistant  
Superintendents of Public Works—State Engineers and Sur-  
veyors—Deputy State Engineers and Surveyors—  
Division Engineers—Resident Engineers.

#### CANAL COMMISSIONERS.\*

Year.	Names.
1810.	Gouverneur Morris, Stephen Van Rensselaer, De Witt Clinton, Simeon De Witt, William North, Thomas Eddy, Peter B. Porter.
1811.	Gouverneur Morris, Stephen Van Rensselaer, De Witt Clinton, Simeon De Witt, William North, Thomas Eddy, Peter B. Porter, Robert R. Livingston, Robert Fulton.
1812.	Gouverneur Morris, Stephen Van Rensselaer, De Witt Clinton, Simeon De Witt, William North, Thomas Eddy, Peter B. Porter, Robert R. Livingston, Robert Fulton.
1813.	Gouverneur Morris, Stephen Van Rensselaer, De Witt Clinton, Simeon De Witt, William North, Thomas Eddy, Peter B. Porter, Robert Fulton.
1814.	Gouverneur Morris, Stephen Van Rensselaer, De Witt Clinton, Simeon De Witt, William North, Thomas Eddy, Peter B. Porter, Robert Fulton.
1815.	Gouverneur Morris, Stephen Van Rensselaer, De Witt Clinton, Simeon De Witt, William North, Thomas Eddy, Peter B. Porter, Charles D. Cooper.
1816.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Joseph Ellicott, Myron Holley.
1817.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Joseph Ellicott, Myron Holley.
1818.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Ephraim Hart, Myron Holley.
1819.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Henry Seymour, Myron Holley.
1820.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Henry Seymour, Myron Holley.
1821.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Henry Seymour, Myron Holley, William C. Bouck.
1822.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Henry Seymour, Myron Holley, William C. Bouck.
1823.	Stephen Van Rensselaer, De Witt Clinton, Samuel Young, Henry Seymour, Myron Holley, William C. Bouck.
1824.	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.
1825.	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.
1826.	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.
1827.	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.

\* The act of April 15, 1817, really created the office of canal commissioner and gave to it the distinctive title; previous legislative resolutions and enactments referred to the office simply as commissioner. Prior to 1817 the commissioners called their documents to the Legislature reports of the commissioners appointed to provide for the improvement of the internal navigation of the state, but the account of the work done in 1816, presented on February 17, 1817, is entitled, "Report of the Canal Commissioners."

## CANAL COMMISSIONERS—(Concluded).

Year.	Names.
1828..	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.
1829..	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.
1830..	Stephen Van Rensselaer, Samuel Young, Henry Seymour, William C. Bouck.
1831..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr.
1832..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr.
1833..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr., Michael Hoffman.
1834..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr., Michael Hoffman.
1835..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr., John Bowman, Heman J. Redfield.
1836..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr., John Bowman, William Baker.
1837..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr., John Bowman, William Baker.
1838..	Stephen Van Rensselaer, Samuel Young, William C. Bouck, Jonas Earll, Jr., John Bowman, William Baker.
1839..	William C. Bouck, Samuel Young, Jonas Earll, Jr., John Bowman, Samuel B. Ruggles, William Baker.
1840..	Samuel B. Ruggles, Henry Hamilton, Asa Whitney, S. Newton Dexter, David Hudson, George H. Boughton.
1841..	Samuel B. Ruggles, Henry Hamilton, Asa Whitney, S. Newton Dexter, David Hudson, George H. Boughton.
1842..	Jonas Earll, Jr., Daniel P. Bissell, Benjamin Enos, George W. Little, James Hooker, Stephen Clark.
1843..	Jonas Earll, Jr., Daniel P. Bissell, Benjamin Enos, George W. Little, James Hooker, Stephen Clark.
1844..	Jonas Earll, Jr., Daniel P. Bissell, Benjamin Enos, George W. Little.
1845..	Jonas Earll, Jr., Daniel P. Bissell, Stephen Clark, Nathaniel Jones.
1846..	Daniel P. Bissell, Stephen Clark, Nathaniel Jones, John T. Hudson.
1847..	Daniel P. Bissell, Stephen Clark, John T. Hudson, Thomas Clowes.
1848..	Charles Cook, Nelson J. Beach, Jacob Hinds.
1849..	Nelson J. Beach, Jacob Hinds, Charles Cook.
1850..	Jacob Hinds, Charles Cook, Frederick Follett.
1851..	Charles Cook, Frederick Follett, John C. Mather.
1852..	Frederick Follett, John C. Mather, Henry Fitzhugh.
1853..	John C. Mather, Henry Fitzhugh, Frederick Follett.
1854..	Henry Fitzhugh, Frederick Follett, Cornelius Gardinier.
1855..	Frederick Follett, Cornelius Gardinier, Henry Fitzhugh.
1856..	Cornelius Gardinier, Henry Fitzhugh, Samuel S. Whallon.
1857..	Henry Fitzhugh, Samuel S. Whallon, Charles H. Sherrill.
1858..	Samuel S. Whallon and Samuel B. Ruggles, Charles H. Sherrill, John M. Jaycox.
1859..	Charles H. Sherrill, John M. Jaycox, Hiram Gardner.
1860..	John M. Jaycox, Hiram Gardner, William I. Skinner.
1861..	Hiram Gardner, William I. Skinner, Benjamin F. Bruce.
1862..	William I. Skinner, William W. Wright, Franklin A. Alberger.
1863..	William I. Skinner, William W. Wright, Franklin A. Alberger.
1864..	William I. Skinner, Benjamin F. Bruce, Franklin A. Alberger.
1865..	William I. Skinner, Benjamin F. Bruce, Franklin A. Alberger.
1866..	Robert C. Dorn, Benjamin F. Bruce, Franklin A. Alberger.
1867..	Robert C. Dorn, Stephen T. Hayt, Franklin A. Alberger.
1868..	Robert C. Dorn, Stephen T. Hayt, John D. Fay.
1869..	Oliver Bascom, Stephen T. Hayt, John D. Fay.
1870..	George W. Chapman, William W. Wright, John D. Fay.
1871..	George W. Chapman, William W. Wright, John D. Fay.
1872..	Alexander Barkley, William W. Wright, John D. Fay.
1873..	Alexander Barkley, Reuben W. Stroud, John D. Fay.
1874..	Alexander Barkley, Reuben W. Stroud, James Jackson, Jr.
1875..	Adin Thayer, Reuben W. Stroud, James Jackson, Jr.
1876..	Adin Thayer, Christopher A. Walrath, James Jackson, Jr.
1877..	Adin Thayer, Christopher A. Walrath, Darius A. Ogden.
1878..	Christopher A. Walrath, Darius A. Ogden.

Canal Commissioners succeeded by Superintendent of Public Works, February 8, 1878.



## MEMBERS OF THE CANAL BOARD.

Year.	Commissioners of the Canal Fund.	Canal Commissioners.	State Engineer and Surveyor.
1826....	(See list of Commissioners of the Canal Fund.)	(See list of Canal Commissioners.)	
1827....	do.	do.	
1828....	do.	do.	
1829....	do.	do.	
1830....	do.	do.	
1831....	do.	do.	
1832....	do.	do.	
1833....	do.	do.	
1834....	do.	do.	
1835....	do.	do.	(Office established by Constitution of 1846.)
1836....	do.	do.	
1837....	do.	do.	
1838....	do.	do.	
1839....	do.	do.	
1840....	do.	do.	
1841....	do.	do.	
1842....	do.	do.	
1843....	do.	do.	
1844....	do.	do.	
1845....	do.	do.	
1846....	do.	do.	
1847....	do.	do.	
1848....	do.	do.	Charles B. Stuart.
1849....	do.	do.	Charles B. Stuart.
1850....	do.	do.	Hezekiah C. Seymour.
1851....	do.	do.	Hezekiah C. Seymour.
1852....	do.	do.	William J. McAlpine.
1853....	do.	do.	William J. McAlpine.
1854....	do.	do.	Henry Ramsay.
1855....	do.	do.	John T. Clark.
1856....	do.	do.	John T. Clark.
1857....	do.	do.	Silas Seymour.
1858....	do.	do.	Silas Seymour.
1859....	do.	do.	Van Rensselaer Richmond.
1860....	do.	do.	Van Rensselaer Richmond.
1861....	do.	do.	Van Rensselaer Richmond.
1862....	do.	do.	Van Rensselaer Richmond.
1863....	do.	do.	William B. Taylor.
1864....	do.	do.	William B. Taylor.
1865....	do.	do.	William B. Taylor.
1866....	do.	do.	William B. Taylor.
1867....	do.	do.	J. Platt Goodsell.
1868....	do.	do.	J. Platt Goodsell.
1869....	do.	do.	Van Rensselaer Richmond.
1870....	do.	do.	Van Rensselaer Richmond.
1871....	do.	do.	Van Rensselaer Richmond.
1872....	do.	do.	Van Rensselaer Richmond.
1873....	do.	do.	William B. Taylor.
1874....	do.	do.	William B. Taylor.
1875....	do.	do.	Sylvanus H. Sweet.
1876....	do.	do.	Sylvanus H. Sweet.
1877....	do.	do.	John D. Van Buren, Jr.
			John D. Van Buren, Jr.
		Superintendent of Public Works. (Succeeded Canal Commissioners February 8, 1878.)	
1878....	do.	Benjamin S. W. Clark....	Horatio Seymour, Jr.
1879....	do.	Benjamin S. W. Clark....	Horatio Seymour, Jr.
1880....	do.	Silas B. Dutcher.....	Horatio Seymour, Jr.
1881....	do.	Silas B. Dutcher.....	Horatio Seymour, Jr.
1882....	do.	Silas B. Dutcher.....	Silas Seymour.
1883....	do.	James Shanahan.....	Silas Seymour.
1884....	do.	James Shanahan.....	Elnathan Sweet.
1885....	do.	James Shanahan.....	Elnathan Sweet.
1886....	do.	James Shanahan.....	Elnathan Sweet.
1887....	do.	James Shanahan.....	Elnathan Sweet.
1888....	do.	James Shanahan.....	John Bogart.
1889....	do.	James Shanahan.....	John Bogart.
1890....	do.	Edward Hannan.....	John Bogart.
1891....	do.	Edward Hannan.....	John Bogart.
1892....	do.	Edward Hannan.....	Martin Schenck.

## MEMBERS OF THE CANAL BOARD—(Concluded).

Year.	Commissioners of the Canal Fund.	Superintendent of Public Works.	State Engineer and Surveyor.
1893....	(See list of Commissioners of Canal Fund.)	Edward Hannan.....	Martin Schenck.
1894....	do.	Edward Hannan.....	Campbell W. Adams.
1895....	do.	George W. Aldridge.....	Campbell W. Adams.
1896....	do.	George W. Aldridge.....	Campbell W. Adams.
1897....	do.	George W. Aldridge.....	Campbell W. Adams.
1898....	do.	George W. Aldridge.....	Campbell W. Adams.
1899....	do.	John N. Partridge.....	Edward A. Bond.
1900....	do.	John N. Partridge.....	Edward A. Bond.
1901....	do.	John N. Partridge.....	Edward A. Bond.
1902....	do.	Charles S. Boyd.....	Edward A. Bond.
1903....	do.	Charles S. Boyd.....	Edward A. Bond.
1904....	do.	Charles S. Boyd.....	} Edward A. Bond.
1905....	do.	Nicholas V. V. Franchot..	} Henry A. Van Alstyne.
			Henry A. Van Alstyne.

## COMMISSIONERS OF THE CANAL FUND.

Year.	Lieutenant-Governor.	Comptroller.	Attorney-General.	Surveyor-General.	Secretary of State.	Treasurer.
1817	John Tayler.....	Archibald McIntyre.....	Martin Van Buren.....	Simeon De Witt.....	Charles D. Cooper.....	Gerret L. Dox.
1818	John Tayler.....	Archibald McIntyre.....	Martin Van Buren.....	Simeon De Witt.....	John Van Ness Yates.....	Gerret L. Dox.
1819	John Tayler.....	Archibald McIntyre.....	Thomas J. Oakley.....	Simeon De Witt.....	John Van Ness Yates.....	Gerret L. Dox.
1820	John Tayler.....	Archibald McIntyre.....	Samuel A. Talcott.....	Simeon De Witt.....	John Van Ness Yates.....	Benjamin Knower.
1821	John Tayler.....	John Savage.....	Samuel A. Talcott.....	Simeon De Witt.....	John Van Ness Yates.....	Benjamin Knower.
1822	John Tayler.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	John Van Ness Yates.....	Abraham Keyser, Jr.
1823	Erastus Root.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	John Van Ness Yates.....	Ganahel H. Barstow.
1824	Erastus Root.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	John Van Ness Yates.....	Abraham Keyser.
1825	James Tallmadge.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1826	Nathaniel Pitcher.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1827	Peter R. Livingston.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1828	Charles Dayan.....	William L. Marcy.....	Samuel A. Talcott.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1829	Enos T. Throop.....	Silas Wright, Jr.....	Greene C. Bronson.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1830	William M. Oliver.....	Silas Wright, Jr.....	Greene C. Bronson.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1831	Edward P. Livingston.....	Silas Wright, Jr.....	Greene C. Bronson.....	Simeon De Witt.....	Asariah C. Flagg.....	Abraham Keyser.
1832	Edward P. Livingston.....	Silas Wright, Jr.....	Greene C. Bronson.....	Simeon De Witt.....	John A. Dix.....	Abraham Keyser.
1833	John Tracy.....	Silas Wright, Jr.....	Greene C. Bronson.....	Simeon De Witt.....	John A. Dix.....	Abraham Keyser.
1834	John Tracy.....	Asariah C. Flagg.....	Greene C. Bronson.....	Simeon De Witt.....	John A. Dix.....	Abraham Keyser.
1835	John Tracy.....	Asariah C. Flagg.....	Greene C. Bronson.....	Simeon De Witt.....	John A. Dix.....	Abraham Keyser.
1836	John Tracy.....	Asariah C. Flagg.....	Greene C. Bronson.....	Simeon De Witt.....	John A. Dix.....	Abraham Keyser.
1837	John Tracy.....	Asariah C. Flagg.....	Samuel Beardsley.....	William Campbell.....	John A. Dix.....	Abraham Keyser.
1838	John Tracy.....	Asariah C. Flagg.....	Samuel Beardsley.....	William Campbell.....	John A. Dix.....	Abraham Keyser.
1839	Luther Bradish.....	Dates Cook.....	Willis Hall.....	Orville L. Holley.....	John C. Spencer.....	Ganahel H. Barstow.
1840	Luther Bradish.....	Dates Cook.....	Willis Hall.....	Orville L. Holley.....	John C. Spencer.....	Jacob Haight.
1841	Luther Bradish.....	John A. Collier.....	Willis Hall.....	Orville L. Holley.....	John C. Spencer.....	Jacob Haight.
1842	Luther Bradish.....	Asariah C. Flagg.....	George P. Barker.....	Nathaniel Jones.....	Samuel Young.....	Thomas Farrington.
1843	Bartholomew.....	Asariah C. Flagg.....	George P. Barker.....	Nathaniel Jones.....	Samuel Young.....	Thomas Farrington.
1844	Daniel S. Dickinson.....	Asariah C. Flagg.....	John Van Buren.....	Hugh Halsey.....	Samuel Young.....	Benjamin Eros.
1845	Addison Gardiner.....	Asariah C. Flagg.....	John Van Buren.....	Hugh Halsey.....	Nathaniel S. Benton.....	Thomas Farrington.
1846	Addison Gardiner.....	Asariah C. Flagg.....	John Van Buren.....	Hugh Halsey.....	Nathaniel S. Benton.....	Thomas Farrington.
1847	Hamilton Fish.....	Millard Fillmore.....	John Van Buren.....	Office of Surveyor-General abolished by Constitutional amendment of 1846 after 1847.	Christopher Morgan.....	Alvah Hunt.
1848	George W. Patterson.....	Millard Fillmore.....	Ambrose L. Jordan.....	State Engineer and Surveyor not made a Commissioner of the Canal Fund.	Christopher Morgan.....	Alvah Hunt.
1849	George W. Patterson.....	Washington Hunt.....	Ambrose L. Jordan.....		Christopher Morgan.....	Alvah Hunt.
1850	George W. Patterson.....	Philio C. Fuller.....	Levi S. Chatfield.....		Christopher Morgan.....	Alvah Hunt.

1851.	Sanford E. Church.	Philo C. Fuller.	Levi S. Chatfield.	Christopher Morgan.	Alvah Hunt.
1852.	Sanford E. Church.	John C. Wright.	Levi S. Chatfield.	Henry S. Randall.	James M. Cook.
1853.	Sanford E. Church.	John C. Wright.	Levi S. Chatfield.	Henry S. Randall.	Benjamin Welch, Jr.
1854.	Sanford E. Church.	James M. Cook.	Levi S. Chatfield.	Henry S. Randall.	Elbridge G. Spaulding.
1855.	Henry J. Raymond.	James M. Cook.	Ogden Hoffman.	Elias W. Leavenworth.	Stephen Clark.
1856.	Henry R. Selden.	Lorenzo Burrows.	Stephen B. Cushing.	Joel T. Headley.	Stephen Clark.
1857.	Henry R. Selden.	Lorenzo Burrows.	Stephen B. Cushing.	Joel T. Headley.	Stephen Clark.
1858.	Robert Campbell.	Sanford E. Church.	Lyman Tremain.	Gideon J. Tucker.	Isaac V. Vanderpool.
1859.	Robert Campbell.	Sanford E. Church.	Lyman Tremain.	Gideon J. Tucker.	Isaac V. Vanderpool.
1860.	Robert Campbell.	Robert Denniston.	Charles G. Myers.	David R. Floyd-Jones.	Philip Dorsheimer.
1861.	Robert Campbell.	Robert Denniston.	Charles G. Myers.	David R. Floyd-Jones.	Philip Dorsheimer.
1862.	Robert Campbell.	Robert Denniston.	Charles G. Myers.	David R. Floyd-Jones.	Philip Dorsheimer.
1863.	Robert Campbell.	Robert Denniston.	Charles G. Myers.	David R. Floyd-Jones.	Philip Dorsheimer.
1864.	David R. Floyd-Jones.	Lucius Robinson.	Daniel S. Dickinson.	Horatio Ballard.	William B. Lewis.
1865.	Thomas G. Alvord.	Lucius Robinson.	Daniel S. Dickinson.	Horatio Ballard.	William B. Lewis.
1866.	Thomas G. Alvord.	Lucius Robinson.	John Cochran.	Chauncey M. Depew.	George W. Schuyler.
1867.	Stewart L. Woodford.	Thomas Hillhouse.	John Cochran.	Chauncey M. Depew.	George W. Schuyler.
1868.	Stewart L. Woodford.	Thomas Hillhouse.	John H. Martindale.	Francis C. Barlow.	Joseph Howland.
1869.	Allen C. Beach.	William F. Allen.	Marshall B. Champlain.	Francis C. Barlow.	Joseph Howland.
1870.	Allen C. Beach.	William F. Allen.	Marshall B. Champlain.	Homer A. Nelson.	Wheeler H. Bristol.
1871.	Allen C. Beach.	William F. Allen.	Marshall B. Champlain.	Homer A. Nelson.	Wheeler H. Bristol.
1872.	Allen C. Beach.	William F. Allen.	Marshall B. Champlain.	Homer A. Nelson.	Wheeler H. Bristol.
1873.	John C. Robinson.	Nelson K. Hopkins.	Francis C. Barlow.	G. Hilton Scribner.	Thomas Raines.
1874.	John C. Robinson.	Nelson K. Hopkins.	Francis C. Barlow.	G. Hilton Scribner.	Thomas Raines.
1875.	William Dorsheimer.	Nelson K. Hopkins.	Daniel Pratt.	Diedrich Willers, Jr.	Thomas Raines.
1876.	William Dorsheimer.	Nelson K. Hopkins.	Daniel Pratt.	Diedrich Willers, Jr.	Thomas Raines.
1877.	William Dorsheimer.	Nelson K. Hopkins.	Charles S. Fairchild.	Diedrich Willers, Jr.	Thomas Raines.
1878.	William Dorsheimer.	Nelson K. Hopkins.	Charles S. Fairchild.	Diedrich Willers, Jr.	Thomas Raines.
1879.	William Dorsheimer.	Nelson K. Hopkins.	Charles S. Fairchild.	Diedrich Willers, Jr.	Thomas Raines.
1880.	George G. Hoskins.	James W. Wadsworth.	Aug. Schoonmaker, Jr.	Diedrich Willers, Jr.	Thomas Raines.
1881.	George G. Hoskins.	James W. Wadsworth.	Aug. Schoonmaker, Jr.	Diedrich Willers, Jr.	Thomas Raines.
1882.	George G. Hoskins.	James W. Wadsworth.	Aug. Schoonmaker, Jr.	Diedrich Willers, Jr.	Thomas Raines.
1883.	David B. Hill.	Ira Davenport.	Hamilton Ward.	Diedrich Willers, Jr.	Thomas Raines.
1884.	David B. Hill.	Ira Davenport.	Hamilton Ward.	Diedrich Willers, Jr.	Thomas Raines.
1885.	Dennis McCarthy.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1886.	Edward F. Jones.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1887.	Edward F. Jones.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1888.	Edward F. Jones.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1889.	Edward F. Jones.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1890.	Edward F. Jones.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1891.	Edward F. Jones.	Alfred C. Chapin.	Leslie W. Russell.	Diedrich Willers, Jr.	Thomas Raines.
1892.	William F. Sheehan.	Frank Campbell.	Simon W. Rosendale.	Diedrich Willers, Jr.	Thomas Raines.
1893.	William F. Sheehan.	Frank Campbell.	Simon W. Rosendale.	Diedrich Willers, Jr.	Thomas Raines.
1894.	William F. Sheehan.	James A. Roberts.	Theodore F. Hancock.	Diedrich Willers, Jr.	Thomas Raines.

## COMMISSIONERS OF THE CANAL FUND—(Concluded).

Year.	Lieutenant-Governor.	Comptroller.	Attorney-General.	Secretary of State.	Treasurer.
1895	Charles T. Saxton	James A. Roberts	Theodore E. Hancock	John Palmer	Addison B. Colvin.
1896	Charles T. Saxton	James A. Roberts	Theodore E. Hancock	John Palmer	Addison B. Colvin.
1897	Timothy L. Woodruff	James A. Roberts	Theodore E. Hancock	John Palmer	Addison B. Colvin.
1898	Timothy L. Woodruff	James A. Roberts	Theodore E. Hancock	John T. McDonough	John P. Jaeckel.
1899	Timothy L. Woodruff	William J. Morgan	John C. Davies	John T. McDonough	John P. Jaeckel.
1900	Timothy L. Woodruff	Theodore P. Gilman	John C. Davies	John T. McDonough	John P. Jaeckel.
1901	Timothy L. Woodruff	Erastus C. Knight	John C. Davies	John T. McDonough	John P. Jaeckel.
1902	Timothy L. Woodruff	Nathan L. Miller	John C. Davies	John T. McDonough	John P. Jaeckel.
1903	Frank W. Higgins	Nathan L. Miller	John Cunneen	John F. O'Brien	John G. Wickser.
1904	Frank W. Higgins	Otto Kelsey	John Cunneen	John F. O'Brien	John G. Wickser.
1905	Matthew Linn Bruce	Otto Kelsey	Julius M. Mayer	John F. O'Brien	J. G. Wallenmeier, Jr.

## SECOND DEPUTY COMPTROLLERS AND SUCCEEDING OFFICERS.

Year.	Second Deputy Comptroller.	Year.	Chief Clerk.	Year.	Auditor.
	[Office established March 11, 1833.]				
1833	George W. Newell.	1840	Visscher Ten Eyck.	1848	Francis H. Ruggles.
1834	George W. Newell.	1841	Visscher Ten Eyck.	1849	Francis H. Ruggles.
1835	George W. Newell.	1842	George W. Newell.	1850	Francis H. Ruggles.
1836	George W. Newell.	1843	George W. Newell.	1851	Francis H. Ruggles.
1837	George W. Newell.	1844	George W. Newell.	1852	George W. Newell.
1838	George W. Newell.	1845	George W. Newell.	1853	George W. Newell.
1839	William W. Treadway.	1846	George W. Newell.	1854	Marius Schoonmaker.
		1847	George W. Newell.	1855	William I. Cornwell.
				1856	Nathaniel S. Benton.
				1857	Nathaniel S. Benton.
				1858	Nathaniel S. Benton.
				1859	Nathaniel S. Benton.
				1860	Nathaniel S. Benton.
				1861	Nathaniel S. Benton.
				1862	Nathaniel S. Benton.
				1863	Nathaniel S. Benton.
				1864	Nathaniel S. Benton.
				1865	Nathaniel S. Benton.
				1866	Nathaniel S. Benton.
				1867	Nathaniel S. Benton.
				1868	James A. Bell.
				1869	James A. Bell.
				1870	James A. Bell.
				1871	Gilson A. Dayton.
				1872	Gilson A. Dayton.
				1873	Gilson A. Dayton.
				1874	Francis S. Thayer.
				1875	Francis S. Thayer.
				1876	George W. Schuyler.
				1877	George W. Schuyler.
				1878	George W. Schuyler.
				1879	George W. Schuyler.
				1880	John A. Place.
				1881	John A. Place.
				1882	John A. Place.
				Office of Auditor of Canal Department abolished March 1, 1883, and duties devolved upon the Comptroller.	

Office of Second Deputy Comptroller abolished and that of Chief Clerk created March 13, 1840.

Office of Chief Clerk abolished and that of Auditor of Canal Department created April 3, 1848.

## CANAL APPRAISERS.

Year.	Names.		
1825..	David Wood.....	Joseph D. Selden.....	Any one of the Canal Commissioners.
1826..	David Wood.....	Joseph D. Selden.....	do.
1827..	David Wood.....	Joseph D. Selden.....	do.
1828..	David Wood.....	Joseph D. Selden.....	do.
1829..	David Wood.....	Joseph D. Selden.....	do.
1830..	David Wood.....	Joseph D. Selden.....	do.
1831..	Benjamin F. Skinner.....	Joseph D. Selden.....	do.
1832..	Benjamin F. Skinner.....	Joseph D. Selden.....	do.
1833..	Benjamin F. Skinner.....	Joseph D. Selden.....	do.
1834..	Benjamin F. Skinner.....	Joseph D. Selden.....	do.
1835..	Benjamin F. Skinner.....	Joseph D. Selden.....	do.
1836..	Benjamin F. Skinner.....	Samuel Cheever.....	William Mann.
1837..	Benjamin F. Skinner.....	Samuel Cheever.....	William Mann.
1838..	Benjamin F. Skinner.....	Samuel Cheever.....	William Mann.
1839..	Benjamin F. Skinner.....	Samuel Cheever.....	George H. Boughton.
1840..	Allen Warden.....	Thomas Clowes.....	Henry C. Martindale.
1841..	Allen Warden.....	Thomas Clowes.....	Henry C. Martindale.
1842..	Allen Warden.....	Thomas Clowes.....	Henry C. Martindale.
1843..	Ambrose Salisbury.....	Thomas Clowes.....	Chester Hayden.
1844..	Ambrose Salisbury.....	David Hamilton.....	Chester Hayden.
1845..	Ambrose Salisbury.....	David Hamilton.....	Chester Hayden.
1846..	Calvin H. Bryan.....	David Hamilton.....	Chester Hayden.
1847..	Calvin H. Bryan.....	David Hamilton.....	Chester Hayden.
1848..	Gideon Hard.....	Elihu H. Phillips.....	David H. Abell.
1849..	Gideon Hard.....	Elihu H. Phillips.....	David H. Abell.
1850..	Andrew H. Calhoun.....	Samuel J. Wilkin.....	Nelson J. Beach.
1851..	Andrew H. Calhoun.....	Samuel J. Wilkin.....	Nelson J. Beach.
1852..	Andrew H. Calhoun.....	William I. Cornwell.....	George H. Boughton.
1853..	Andrew H. Calhoun.....	William I. Cornwell.....	Darius A. Ogden.
1854..	Andrew H. Calhoun.....	William I. Cornwell.....	Darius A. Ogden.
1855..	Ashbell B. Parmelee.....	Henry H. Hull.....	William Wasson.
1856..	Ashbell B. Parmelee.....	Henry H. Hull.....	William Wasson.
1857..	Ashbell B. Parmelee.....	Henry H. Hull.....	William Wasson.
1858..	Ashbell B. Parmelee.....	Henry H. Hull.....	William Wasson.
1859..	Ashbell B. Parmelee.....	Henry H. Hull.....	William Wasson.
1860..	Ashbell B. Parmelee.....	Thomas B. Carroll.....	William Wasson.
1861..	Ashbell B. Parmelee.....	Thomas B. Carroll.....	William Wasson.
1862..	Ashbell B. Parmelee.....	Thomas B. Carroll.....	William Wasson.
1863..	Ashbell B. Parmelee.....	Thomas B. Carroll.....	William Wasson.
1864..	Ashbell B. Parmelee.....	Thomas B. Carroll.....	William Wasson.
1865..	Elijah P. Brooks.....	Beman Brockway.....	William Wasson.
1866..	Elijah P. Brooks.....	Beman Brockway.....	William Wasson.
1867..	Elijah P. Brooks.....	Beman Brockway.....	William Wasson.
1868..	Elijah P. Brooks.....	Beman Brockway.....	William Wasson.
1869..	Elijah P. Brooks.....	Beman Brockway.....	William Wasson.
1870..	Jesse Gay.....	George C. Greene.....	Samuel North.
1871..	Jesse Gay.....	George C. Greene.....	Samuel North.
1872..	Jesse Gay.....	George C. Greene.....	Samuel North.
1873..	Charles G. Myers.....	Thaddeus C. Davis.....	Vivus W. Smith.
1874..	Charles G. Myers.....	Thaddeus C. Davis.....	Vivus W. Smith.
1875..	Charles G. Myers.....	Thaddeus C. Davis.....	Vivus W. Smith.
1876..	Charles G. Myers.....	Thaddeus C. Davis.....	Vivus W. Smith.
1877..	Charles G. Myers.....	Hesekiah Sturges.....	Vivus W. Smith.
1878..	Charles G. Myers.....	Hesekiah Sturges.....	Vivus W. Smith.
1879..	Charles G. Myers.....	Hesekiah Sturges.....	Vivus W. Smith.
1880..	William L. Bostwick.....	Charles M. Dennison.....	William J. Morgan.
1881..	William L. Bostwick.....	Charles M. Dennison.....	William J. Morgan.
1882..	William L. Bostwick.....	Charles M. Dennison.....	William J. Morgan.

Canal Appraisers abolished and Board of Claims created April 7, 1883.

## BOARD OF CLAIMS.

1883..	Lyman H. Northrup.....	George M. Beebe.....	Henry F. Allen.
1884..	Lyman H. Northrup.....	George M. Beebe.....	Henry F. Allen.
1885..	Lyman H. Northrup.....	George M. Beebe.....	Henry F. Allen.
1886..	George M. Beebe.....	Henry F. Allen.....	William L. Muller.
1887..	George M. Beebe.....	Henry F. Allen.....	William L. Muller.
1888..	George M. Beebe.....	Henry F. Allen.....	William L. Muller.
1889..	George M. Beebe.....	Henry F. Allen.....	William L. Muller.
1890..	George M. Beebe.....	Henry F. Allen.....	William L. Muller.
1891..	George M. Beebe.....	Henry F. Allen.....	William L. Muller.
1892..	George M. Beebe.....	Hugh Reilly.....	Wilbur F. Porter.

## BOARD OF CLAIMS—(Concluded).

Year.	Names.		
1893..	Wilbur F. Porter.....	Hugh Reilly.....	George M. Beebe.
1894..	Wilbur F. Porter.....	Hugh Reilly.....	George M. Beebe.
1895..	Wilbur F. Porter.....	Hugh Reilly.....	George M. Beebe.
1896..	Wilbur F. Porter.....	Hugh Reilly.....	George M. Beebe.
1897..	Wilbur F. Porter.....	Hugh Reilly.....	George M. Beebe.

Board of Claims abolished and Court of Claims created March 9, 1897.

## COURT OF CLAIMS.

1897..	Charles T. Saxton.....	John F. Parkhurst.....	George M. Beebe.
1898..	Charles T. Saxton.....	John F. Parkhurst.....	George M. Beebe.
1899..	Charles T. Saxton.....	John F. Parkhurst.....	George M. Beebe.
1900..	Charles T. Saxton.....	John F. Parkhurst.....	John M. Kellogg.
1901..	Charles T. Saxton.....	John F. Parkhurst.....	John M. Kellogg.
1902..	Charles T. Saxton.....	Gilbert D. B. Hasbrouck..	John M. Kellogg.
1903..	Charles T. Saxton.....	Gilbert D. B. Hasbrouck..	Theodore H. Swift.
1904..	Adolph J. Rodenbeck.....	Gilbert D. B. Hasbrouck..	Theodore H. Swift.
1905..	Adolph J. Rodenbeck.....	Charles H. Murray.....	Theodore H. Swift.

## SUPERINTENDENTS OF PUBLIC WORKS.

(See list of Members of the Canal Board.)

## DEPUTY SUPERINTENDENTS OF PUBLIC WORKS.

Names.	Years.
Patrick J. McWeeney.....	1896-7-8.
Elon H. Hooker.....	1899, 1900-1.
Winslow M. Mead.....	1901-2-3-4-5.

## ASSISTANT SUPERINTENDENTS OF PUBLIC WORKS.

Names.	Years.
<i>Eastern Division.</i>	
James Shanahan.....	1878-9-80.
James D. Hancock.....	1881-2-3-4.
Charles Zielley.....	1884-5-6-7-8-9.
George E. Simmons.....	1890-1-2-3-4.
John N. Parker.....	1895-6-7-8-9-1900-1-2-3-4-5.
<i>Middle Division.</i>	
John Stebbins.....	1878-9-80.
William H. Van Rensselaer.....	1881-2-3.
John Stebbins.....	1883-4-5-6-7-8-9.
James H. Flanagan.....	1890-1-2-3-4.
Thomas Wheeler.....	1895-6-7-8-9-1900-1-2-3-4-5.
<i>Western Division.</i>	
Linus Jones Peck.....	1878.
Henry L. Fish.....	1879-80.
Ossian Bedell.....	1881-2-3.
Ira Betts.....	1884-5-6-7-8.
George Chambers.....	1889-90-1-2-3.
Charles McDonough.....	1893-4-5.
R.G. Lay.....	1895-6-7-8.
Albert H. Fortes.....	1899.
Houston Barnard.....	1899-1900-1-2-3-4-5.



## STATE ENGINEERS AND SURVEYORS.

(See list of Members of the Canal Board.)

## DEPUTY STATE ENGINEERS AND SURVEYORS.

Names.	Years.
Francis H. Ruggles.....	1857.
George R. Perkins.....	1858-9-60-1.
Sylvanus H. Sweet.....	1862-3-4.
Robert H. Sherman.....	1865.
James Barnes.....	1866-7.
Sylvanus H. Sweet.....	1868-9-70-1.
John A. Cooper.....	1872-3.
Henry A. Petrie.....	1874.
David M. Greene.....	1875-6-7.
Edward D. Smalley.....	1878-9-80-1-2-3.
Charles Hilton.....	1884.
R. M. Hasbrouck.....	1885.
John Bogart.....	1886-1887.
Arthur S. C. Wurtele.....	1888-9-90-1.
Chapman L. Johnson.....	1892-3.
Frank R. Becker.....	1894.
Herschel Roberts.....	1895-6-7-8-9.
William Pierson Judson.....	1901-2-3-4.
Edmund F. Van Hoesen.....	1905.

## SPECIAL DEPUTY STATE ENGINEER AND SURVEYOR.

Name.	Year.
Henry C. Allen.....	1904-5.

## DIVISION ENGINEERS.

*Eastern Division.*

Names.	Years.
Chas. A. Olmstead.....	1850-1-2.
Geo. Cole (acting).....	1853.
Daniel C. Jenne.....	1854-5-6.
J. Platt Goodsell.....	1856-7-8-9-60.
Wm. B. Taylor.....	1860-1.
Daniel C. Jenne.....	1862-3-4-5-6-7.
Oscar L. Wetmore.....	1867-8.
E. H. Crocker.....	1868-9-70-1-2.
Wm. B. Cooper.....	1872-3-4.
David M. Greene.....	1874.
Chas. Hilton.....	1874.
John B. Yates.....	1874-5-6.
Elnathan Sweet, Jr.....	1876-7-8-9-80.
W. Scott Lasher.....	1880-1.
Chas. A. Beach.....	1882-3.
R. M. Hasbrouck.....	1884.
John R. Kaley.....	1884-5-6-7.
Chapman L. Johnson.....	1888-9-90-1.
John P. Kelley.....	1891-2-3-4.
Herschel Roberts.....	1894.
DeWitt C. Smith.....	1894-5-6-7-8-9.
Trevor C. Leutze.....	1899-1900-1.
Henry A. Van Alstyne.....	1901-2-3-4.
Charles W. Trumbull.....	1904-5.

## DIVISION ENGINEERS.

*Middle Division.*

Names.	Years.
John T. Clark.....	1850-1-2.
Van Rensselaer Richmond.....	1852-3-4-5-6.
Orville C. Hartwell.....	1856-7.
Henry Van Vleck.....	1858-9-60-1-2.
J. Platt Goodsell.....	1862-3-4-5-6.
Wm. H. H. Gere.....	1866-7-8.
M. S. Kimball.....	1868-9-70-1-2.
Howard Soule, Jr.....	1872-3-4.
Chas. A. Sweet.....	1874-5-6-7-8.
Marvin Porter.....	1878-9-80-1-2.
David E. Whitford.....	1882-3-4.
Denison Richmond.....	1884-5-6-7-8.
Henry T. Beach.....	1888-9-90-1-2.
Russell R. Stuart.....	1892-3-4.
Wm. H. H. Gere.....	1894-5-6-7-8-9-1900-1-2-3-4.
Charles O. McComb.....	1904-5.

## DIVISION ENGINEERS.

*Western Division.*

Names.	Years.
Jerome B. Stillson.....	1850-1-2.
John D. Fay.....	1852-3.
Van Rensselaer Richmond (acting).....	1854.
John Lathrop.....	1854.
Chas. W. Wentz.....	1855-6.
John D. Fay.....	1856-7-8-9-60.
Orville W. Storey.....	1860-1-2-3-4-5-6.
Walter W. Jerome (acting).....	1866-7-8.
Daniel Richmond.....	1868-9-70-1-2.
J. Frederick Behn.....	1872-3.
John D. Fay.....	1874-5.
Byron M. Hanks (acting).....	1875.
Chas. A. Olmsted.....	1875-6.
Wm. H. Searles.....	1876-7-8.
Thomas Evershed.....	1878-9-80-1-2-3-4-5-6-7-8-9-90.
John Bisgood.....	1890-1-2-3-4-5.
J. L. Little.....	1895-6-7-8-9.
A. J. Rockwood.....	1899-1900-1-2-3-4-5.

## RESIDENT ENGINEERS.

*Eastern Division.*

Names.	Years.	Residency.
J. Platt Goodsell.....	1850-1-2.....	First Subdivision.
Orville W. Storey.....	1850.....	Second Subdivision.
Daniel C. Jenne.....	1850-1-2.....	Second Subdivision.
Francis F. Curry.....	1852-3.....	Eastern Subdivision.
Francis F. Curry.....	1852-3-4.....	Western Subdivision.
Wm. A. Perkins.....	1852-3-4.....	Eastern Subdivision.
Chas. W. Wents.....	1854-5.....	Eastern Subdivision.
Wm. B. Taylor.....	1854-5-6.....	Western Subdivision.
Spencer Cole.....	1855.....	First Subdivision.
John L. Stephenson.....	1855-6.....	Third Residency.
Nelson J. Beach.....	1855-6.....	Fourth Residency.
Stephen A. Charles.....	1856.....	Third Residency, Eastern Subdivision.
Wm. McCammon.....	1856.....	First Residency.
Thos. H. Bates.....	1856.....	Second Residency, Western Subdivision.
E. W. Butler.....	1856.....	Second Residency, Eastern Subdivision.
Spencer Cole.....	1856.....	Fourth Residency.
H. V. B. Barker.....	1857-8.....	First Residency, Eastern Subdivision.
George H. Clark.....	1857-8.....	First Residency, First Subdivision.
Thos. H. Bates.....	1857-8.....	Second Residency, Second Subdivision.
Wm. B. Taylor.....	1857-8.....	Third Residency, Third Subdivision.
Wm. B. Taylor.....	1858-9-60.....	Fourth Residency, Fourth Subdivision.
H. V. B. Barker.....	1858-9-60.....	Third & Fourth Residencies.
Ogden Edwards.....	1860-1.....	First & Second Residencies.
E. W. Butler (acting).....	1861.....	
Wm. B. Cooper.....	1861-2-3-4-5.....	
Oscar L. Wetmore.....	1865-6-7.....	
Peter Hogan.....	1868-9-70-1-2.....	
Walter W. Jerome.....	1872-3-4.....	
Charles Hilton.....	1874.....	
Stephen E. Babcock.....	1874-5-6.....	
Bryant Goodwin.....	1876-7-8.....	
W. Scott Lasher.....	1878-9-80.....	
Henry Gould.....	1880-1.....	
C. L. Phelps.....	1881.....	
Henry C. Parsons.....	1882-3.....	
Chapman L. Johnson.....	1884-5-6-7.....	
John P. Kelley.....	1888-9-90-1.....	
Jay W. Clark.....	1892-3-4.....	
De Witt C. Smith.....	1894.....	
Albert J. Himes.....	1894-5-6-7.....	
John G. Teit.....	1897-8.....	
Henry A. Van Alstyne.....	1899-1900-1.....	
Wm. B. Landreth.....	1901-2-3-4-5.....	
John R. Kaley.....	1904-5.....	
Noble E. Whitford.....	1905.....	
H. P. Willis.....	1905.....	
S. M. Savage.....	1905.....	
Charles H. Flanagan.....	1905.....	

## RESIDENT ENGINEERS.

*Middle Division.*

Names.	Years.	Residency.
John T. Clark.....	1850.....	Eastern Subdivision.
James Barnes.....	1850.....	Eastern Subdivision.
Chas. W. Wents.....	1850-1-2.....	Western Subdivision.
L. L. Nichols.....	1851-2-3.....	Eastern Subdivision.
Morris S. Kimball.....	1851-2-3-4-5-6.....	Oswego Canal.
Morris S. Kimball.....	1857-8.....	Seventh Residency, Third Subdivision.
Morris S. Kimball.....	1858-9-60.....	Sixth Residency, Third Subdivision.
Morris S. Kimball.....	1861.....	Oswego Canal.
Morris S. Kimball.....	1862.....	Second Residency.
Orville C. Hartwell.....	1852-3-4.....	Eastern Subdivision.
Wm. B. Vedder.....	1852-3-4.....	Western Subdivision.
M. C. Fremyre.....	1854-5-6.....	First Residency, Eastern Subdivision.
M. C. Fremyre.....	1857-8.....	Sixth Residency, Second Subdivision.
M. C. Fremyre.....	1858-9.....	Fifth Residency, Second Subdivision.
Ogden Edwards.....	1854-5-6.....	Second Residency, Western Subdivision.
Ogden Edwards.....	1857-8.....	Fifth Residency, First Subdivision.
Ogden Edwards.....	1858-9.....	Fourth Residency, First Subdivision.
Ogden Edwards.....	1862.....	
Daniel Richmond.....	1856-7.....	First Residency.
Winslow L. Kidder.....	1856.....	Second Residency.
Winslow L. Kidder.....	1857-8.....	Eighth Residency, Fourth Subdivision.
S. H. Sweet.....	1859-60.....	Fifth Residency, Second Subdivision.
Wm. H. H. Gere.....	1860-1-2.....	First Residency.
M. S. Kimball.....	1862-3.....	
Wm. H. H. Gere.....	1864-5-6.....	
Howard Soule, Jr.....	1866-7-8-9-70-1-2.....	
Byron M. Hanks.....	1866-7-8.....	Chenango Canal Ex.
Chas. L. McAlpine.....	1868-9-70-1.....	Chenango Canal Ex.
Thomas Goodsell.....	1872-3-4.....	
Albert Hill.....	1874.....	
Denison Richmond.....	1874-5-6-7-8-9-80-1-2-3-4.....	
Henry T. Beach.....	1885-6-7-8.....	
David E. Whitford.....	1889-90-1-2-3-4.....	
George A. Morris.....	1894-5-6-7-8-9.....	
Henry C. Allen.....	1900-1-2-3.....	
Fred W. Sarr.....	1904-5.....	
Guy Moulton.....	1904-5.....	
Emile Low.....	1905.....	
B. E. Failing.....	1905.....	
M. B. Palmer.....	1905.....	

## RESIDENT ENGINEERS.

*Western Division.*

Names.	Years.	Residency.
Jerome B. Stillson.....	1850.	
Daniel Marsh.....	1850-1-2.....	First Subdivision.
David Hurd.....	1850-1.....	Second Subdivision.
John Lathrop.....	1850.....	Third Subdivision.
John Lathrop.....	1851.....	Second Subdivision.
John Lathrop.....	1852.....	Western Subdivision.
J. B. Mills.....	1850.....	Genesee Valley Canal.
O. W. Storey.....	1850-1-2-3-4-5-6.....	Genesee Valley Canal.
O. W. Storey.....	1862.....	
Richard Vernam.....	1852-3-4.....	First Subdivision and Gene- see Valley Canal.
Richard Vernam.....	1855-6.....	Second Residency.
Richard Vernam.....	1857-8.....	Tenth Residency, Third Sub- division.
Richard Vernam.....	1858.....	Eleventh Residency, Third Subdivision.
Richard Vernam.....	1858-9.....	Eighth Residency, Third Subdivision.
Thomas Evershed.....	1852.....	Middle Subdivision.
George Cole.....	1852-3-4.....	Western Subdivision.
Chas. G. Voorhees.....	1854-5.....	First Subdivision.
Henry Van Vleck.....	1854-5.....	Second Subdivision.
Theophilus Williams.....	1854-5-6.....	Third Residency.
Edward Colman.....	1854-5.....	Fourth Residency.
Wm. H. H. Gere.....	1855-6.....	First Residency.
Ensign Bennett.....	1856.....	First Residency.
Ensign Bennett.....	1857-8.....	Ninth Residency, First Sub- division.
Ensign Bennett.....	1858-9-60-1.....	Seventh Residency, First Subdivision.
Ensign Bennett.....	1862.....	Western Subdivision.
H. V. B. Barker.....	1856.....	Third Residency.
R. H. Colburn.....	1856.....	Fourth Residency.
R. H. Colburn.....	1857-8.....	Twelfth Residency, Fourth Subdivision.
Hugh M. Severance.....	1856.....	Fifth Residency.
Hugh M. Severance.....	1857-8.....	Eleventh Residency, Third Subdivision.
Daniel Richmond.....	1858-9-60-1-2.....	Ninth Residency, Third Sub- division.
Wm. J. Keeler.....	1858-9-60-1.....	Tenth Residency, Fourth Subdivision.
Walter W. Jerome.....	1862-3-4-5-6-7-8.....	
J. Nelson Tubbs.....	1869-70-1-2.....	
Byron M. Hanks.....	1872-3-4-5-6-7.....	
Thomas Evershed.....	1877-8.....	
John Bisgood.....	1878-9-80-1-2-3-4-5-6-7-8 9-90.....	
Fred N. Kimball.....	1890-1-2.....	
Albert T. Jones.....	1892-3-4-5-6.....	
C. R. Neher.....	1896-7-8-9-1900.....	
M. W. Wilbur.....	1900-1-2-3-4-5.....	
G. T. Keith.....	1904-5.....	
Thomas W. Barrally.....	1905.....	

## CHAPTER III.

### BIOGRAPHIES OF ENGINEERS.

Short biographical sketches of the State Engineers to the present time, and of other engineers who have attained to the rank of Assistant Engineer, or higher in the State service (those who have died, and of those who are living only those who attained to that rank at least twenty-five years ago).

It was intended originally to include in this part of the volume as many biographies as could be collected of the engineers who have attained to the rank of assistant engineer, or higher, in the service of the New York State canals throughout their history, but a complete list would contain the names of nearly eight hundred men, many of them with a prospect of years of active service still before them. Accordingly it was decided to include only those engineers whose careers are nearly or quite completed.<sup>1</sup> This selection excludes many prominent engineers who have served the State in recent years in various expert capacities, and it also excludes many who have become prominent in other lines of work, but who in earlier years labored on the canals in minor positions. The biographies of some of the best-known of the early engineers could not be secured, no clue to the whereabouts of descendants or relatives being obtainable; the correct addresses of many others were probably learned, but no responses were received to inquiries. As this portion of the book is but a small part of the whole volume, it was not deemed important enough to warrant more effort to secure biographies than might be accomplished by means of a limited correspondence.

Among the engineers who have been employed on the canals there are many instances of long service that merit especial notice. Probably the oldest of the living engineers is Mr. George E. Gray, who entered the service in 1839. Mr. W. H. H. Gere stands first in the length of period within which connection with the canals existed—fifty-six years, but only about half of that time was spent in the service. Mr. David E. Whitford easily ranks first in length of service, having been connected with the department during a period of fifty-four years, fifty of which have been spent in its employ. Then come Morris S. Kimball and John Bisgood, with about forty years of service; L. L. Nichols with thirty-five; O. W. Childs, O. W. Storey, Daniel C. Jenne, Van R. Richmond, Bruce J. Kimball and J. Nelson Tubbs, with about thirty years; Alfred Barrett, J. Platt Goodsell, Thomas Goodsell, Daniel Richmond, Denison Richmond, George Arnoldt and Thomas Evershed, with about a quarter of a century; and Holmes Hutchinson, William J. McAlpine, O. H. Bogardus, William B. Taylor, Howard Soule, Walter W. Jerome, Charles

<sup>1</sup>The material collected concerning the younger engineers will be filed in the office of the State Engineer for future reference.

Truesdell, William B. Cooper, Byron Holley, Charles D. Burrus and John R. Kaley, with twenty years or more.

These are the engineers of the earlier generation, who have served many years and have achieved some distinction on the canals; there have been others who have risen to prominence but have served fewer years, and still others who have given long and faithful service in the minor positions. Among the more recent men there are many who have already spent ten, twenty or even more years in the State's employ.

In these sketches it will be seen that some of the engineers rose to high rank in their country's service during the Civil War. Among them was the first man to hold the office of State Engineer, but material for his biography was not obtainable. It will be noticed also that one full-blooded Indian is found in the list of engineers—Ely S. Parker—who later became prominent as Gen. Grant's secretary during the war.

ADAMS, CAMPBELL W., born Dec. 19, 1852, at Utica, N. Y.; educated at Utica Academy.

In 1872, Mr. Adams became an assistant to Wm. H. Christian, City Surveyor of Utica, and the following year when Mr. Christian's term expired, they formed a partnership and carried on a general surveying business. In 1873 and 1874 Mr. Adams had charge of building the Savage reservoir at the end of Pleasant Street, Utica, for the Utica Water Works Co. From 1875 to 1880 he was a traveling salesman for the firm of Adams Bros., rope manufacturers, resigning to accept an appointment as City Surveyor of Utica, serving until 1885. He was appointed Constructing Engineer for the Delaware and Hudson Canal Co., on the Albany and Susquehanna division, but a year later returned to Utica and served as Assistant City Surveyor during Mayor Kinney's administration. In 1887 was employed as Resident Engineer for the Rome, Watertown and Ogdensburg R. R., supervising the construction of the branch road from Rochester to Windsor Beach on Lake Ontario; of a viaduct at Harpersville, N. Y., and of a bridge over the Genesee river. He was again appointed Assistant City Surveyor of Utica in 1888 and in 1891 was one of the engineering corps on the Adirondack and St. Lawrence R. R. In 1892 he was appointed City Surveyor of Utica and reappointed in 1893.

Mr. Adams was elected to the office of State Engineer and Surveyor of New York in the fall of 1893, was reelected in 1895 and on account of the change in the term of office continued through 1898. During 1901, 1902 and 1903 he was engaged in building a railway and harbor for the Dunderland Iron Co., Ltd., of London, England, on the west coast of Norway, near the Arctic circle. During 1904 and 1905 he was retained as Superintendent of this work, during which time the plant has been completed for mining, concentrating and briquetting about twenty-five hundred tons daily of iron ore for shipment to England. In December, 1905, he was made General Manager of the entire works.

ANDRUS, DANIEL HOLLAND, born Aug. 31, 1835, at Auburn, N. Y.; educated at Auburn and at Geneva, N. Y.; died Sept. 1, 1864.

Mr. Andrus held the position of Assistant Engineer on the New York State canals during 1857 and 1858. He was studying law when the Civil war broke out and left his studies to take the appointment of First Lieutenant, Company A, of the 50th Regiment of Engineers under Col. Charles B. Stuart. Owing to ill health, Mr. Andrus was obliged to resign from the army in the spring of 1863.

ARNOLDT, GEORGE, born Oct. 18, 1820, at Heidelberg, Germany; educated at the University of Heidelberg and the Polytechnic School at Karlsruhe; died April 17, 1893, at Rochester, N. Y.

Having graduated with honors, Mr. Arnoldt obtained a position with the German Government and was employed in the survey and construction of the sections of railroad between Heidelberg and Mannheim and Heidelberg and Frankfort. Arriving in New York about 1848, Mr. Arnoldt remained there one year, then proceeded to Rochester where he found employment with the nursery firm of Elwanger and Barry. He entered the department of the State Engineer of New York a few months later

and was engaged on canal work from about 1850 to 1876. During his service with this department he held the positions of Second Assistant Engineer in 1862, Temporary Assistant in 1863, Second Assistant from 1864 to 1866, and Assistant from 1867 to 1876.

**AVERILL, HENRY KETCHUM, JR.**, born March 26, 1830, at Plattsburg, N. Y.; educated at Plattsburg Academy. Member of Plattsburg Institute.

In 1851 Mr. Averill was Assistant Engineer on the Plattsburg and Montreal R. R. The same year he removed to Iowa and laid out a State road of about one hundred and thirty miles in length. For about eight years, beginning with 1852, he was County Surveyor of Clayton and Winneshiek counties, Iowa, and in 1853 was appointed U. S. Dept. Surveyor, and subdivided seven townships of public land. He returned to Plattsburg and opened a surveying office in 1863, and in 1868 made a complete survey of Chazy lake and flow-line, and laid out the dam. In 1869, and subsequently, Mr. Averill made hydrographic surveys for the United States Government on Lake Champlain; he also made many surveys of counties, towns, mines, woodlands and lakes in the Adirondack region, for individuals. He was appointed Topographic Engineer on the survey of the Champlain canal enlargement in 1870 and later Draftsman in the office of the Division Engineer for the eastern division. In 1871 he made the preliminary and location surveys for the Plattsburg waterworks and in 1871 and 1872 was Leveler on the survey of the New York and Canada R. R., now the D. & H. In 1878 Mr. Averill was appointed Division Engineer of Adirondack Survey and also Engineer in charge of State land surveys, Clinton County.

**BAERMAN, PALMER H.**, born Aug. 4, 1847, at West Troy, N. Y.; graduated from the Rensselaer Polytechnic, Troy, N. Y., 1867; died Sept. 18, 1897.

After graduating, Mr. Baerman entered the service of the New York and Oswego Midland R. R. where he remained two years; later with the New York Central one year; and then was village Surveyor of West Troy. He held the position of Assistant Engineer on the New York State canals in 1872, and was later Engineer-in-charge on the waterworks of the Hudson River State Hospital at Poughkeepsie, N. Y., for two and one-half years. He became Chief Engineer of the Water Works at West Troy, Johnstown, Richfield Springs, Cooperstown, Norwich, Sherburne and Lansingburg; Assistant Superintendent and Chief Engineer of the Troy Water Works and designed the Water Works for Amsterdam, Greene, Deposit, and Oneonta. In 1889 he was appointed Engineer of the Public Improvement Commission of Troy, N. Y., and served until 1890. His last position was City Engineer of Troy from 1893 to 1894.

**BAGG, EGBERT**, born Feb. 2, 1820, at Utica, N. Y.; educated at Hobart College, then known as Geneva College; died Nov. 18, 1885.

Mr. Bagg was First and Second Assistant Engineer on the New York State canals in 1853, 1854, 1855, 1861 and 1862, and was Assistant Engineer in 1870. He was First Lieutenant, Captain and Major of the 117th New York State Volunteers from 1862 to 1865, and was brevetted Lieutenant Colonel of United States Volunteers for gallant and meritorious service at Fort Fisher, N. C. Col. Bagg was City Surveyor of Utica, N. Y., for several terms, both before and after the war, and was Landscape Gardener and Superintendent of Forest Hill Cemetery for several years.

**BARNES, JAMES**, born in 1806, in Massachusetts; graduated from West Point Military Academy in 1829; died Feb. 12, 1869, at Springfield, Mass. Member of American Society of Civil Engineers.

After graduating, Gen. Barnes spent one year as Assistant Teacher at West Point, and from the following year to 1833 was on duty at Fort McHenry, Md., at Charleston, S. C., and at Fortress Monroe, Va. From 1833 to 1836 he was Assistant Instructor of Infantry Tactics at West Point. Retiring from the army, he entered the employ of the Western R. R., now a part of the Boston and Albany R. R., and served as Assistant Engineer, Chief Engineer, and Superintendent. During this time he also served as Chief Engineer and Superintendent of the Seaboard and Roanoke R. R. from Norfolk, Va., to Weldon, N. C. About this time he became a member of the firm of Phelps, Mattoon and Barnes, of Springfield, Mass. He was engaged on the New York State Canals as Resident Engineer from 1841 to 1843 and from 1848 to 1850, and as Assistant Engineer 1851 to 1852. From 1853 to 1854 he was retained by the Russian Government as Consulting Engineer of the railroad from St. Petersburg to Moscow. In 1861 he became Colonel of the 18th Massachusetts



Infantry and was in command of the defences of Norfolk and Portsmouth, Va., in the latter part of 1863. March 13, 1865, he was brevetted Major-General of Volunteers and mustered out of service January 15, 1866. He then returned to the service of New York State and was Deputy State Engineer in 1866 and 1867. Gen. Barnes was appointed, 1868, a member of a special U. S. Commission to examine and report on the road and telegraph line of the Union Pacific R. R. Co.

BARRETT, ALFRED, born ———; died July, 1849, at Montreal, Canada.

Mr. Barrett was a native of New England. As a young man he joined the engineering force of the Erie canal, within a year after the beginning of that great undertaking. He rose rapidly, being ranked as an Engineer in 1821. This position he held, with a few intermissions, till 1837, when he became Resident Engineer, and from 1838 to 1843 he served as Chief Engineer. The most important work on the canal, with which he was connected, was the construction of the Lockport locks. During both the original building and the subsequent enlargement of these structures he held an important position in superintending their construction. Two men, John Bisgood and Thomas Evershed, who served as rodmen under Mr. Barrett at the time of enlarging these locks, later became prominent as engineers on the canals. He was also engaged upon the construction of the Welland canal and upon other works in Canada. He removed to Montreal, Canada, about 1843, where he spent the remainder of his life, being engaged on various public works. Mr. Barrett's son followed in his father's footsteps, being an engineer on the canals; and he in turn was followed by two sons who for years have been engaged on canal work.

BARRETT, ALFRED W., JR., born in 1829, at Lockport, N. Y.; educated at Military and Polytechnic School, Montreal, Canada; died in 1875.

For a time Mr. Barrett assisted his father on the public works of Canada. At some time in the early 'fifties he was one of a party of engineers on the survey of the Adirondacks. In 1854 he was appointed Second Assistant Engineer on the western division of the New York State canals and remained on that division until his death.

BARTOW, ANDREW ABRAMSE, born 1773, at Westchester, Westchester Co., N. Y.; died May 21, 1861, at West Farms, Westchester Co., N. Y.

Mr. Bartow was Engineer on the canals of New York State from 1817 to 1825. It has been claimed that he made the first discovery of "water lime" in this country, although the discovery of "water lime" or hydraulic cement was claimed by Canvass White and patented by him in 1820. The incidents attending this discovery are related elsewhere in this volume in connection with the building of the Erie canal.

BATES, DAVID STANHOPE, born June 10, 1777, near Morristown, N. J.; took an academic course under Rev. Mr. Witherspoon; died Nov. 28, 1839, at Rochester, N. Y.

Mr. Bates was Engineer on the New York State canals from 1817 to 1828, on the construction of the important work across the Irondequoit valley, the aqueduct over the Genesee river at Rochester, the combined locks at Lockport, and other works. He was appointed Principal Engineer of the canals of Ohio, and served from 1825 to 1839; at the same time he was Chief Engineer of the Louisville and Portland Canal Company. In 1829 he was appointed Chief Engineer in charge of the survey and location of the Chenango canal from Utica to Binghamton, and in 1830, to make the surveys for a canal from Rochester to Olean, now known as the Genesee Valley canal. In 1831 he made a preliminary survey for a railroad from Canandaigua to Rochester, and later constructed upon this route the Auburn and Rochester R. R.; he also located and constructed a railroad from Rochester to Carthage. His next appointment was as Engineer of the Niagara River Hydraulic Company. In 1834 Mr. Bates was engaged as Engineer-in-Chief by the State of Michigan to make examinations and surveys for the Erie and Kalamazoo R. R.

BEACH, CHARLES A., born May 26, 1823, at Pompey, N. Y.; educated at Pompey Academy; died Nov. 22, 1898.

Mr. Beach entered the State Engineer's Department at Syracuse in 1854, and remained in the service, with a few intermissions, till 1871. He was in charge of the construction of the De Ruyter reservoir in 1861. After this he was engaged for a time on the Chenango canal extension, and then became City Engineer of Binghamton. In 1882 Mr. Beach was appointed Division Engineer of the eastern division. He was Inspector for the State during the construction of the New

York, West Shore and Buffalo Railroad, and from 1893 to 1895 was Engineer-in-Charge on the construction of the Woodlawn reservoir, Syracuse, N. Y.

BEACH, CHAS. H., born 1819, at Kingsbury, Washington county, N. Y.; educated under the Rev. Dr. Eastman and at the Salem Academy; died in 1901, at Sandy Hill, N. Y.

Mr. Beach was first engaged on the New York State canals in 1848, and was Second Assistant Engineer from 1850 to 1852 and First Assistant Engineer from 1854 to 1856. Later he was clerk in the Commissary Department under Captain (afterwards Colonel) Martindale. From this office he went to the Paymaster General's office at Washington, and later was transferred to the U. S. Treasury and remained in the Treasury Department until 1869, when he was obliged to retire on account of ill health.

BEACH, HENRY THOMPSON, born June 25, 1844, at Salina (now Syracuse), N. Y.; educated at the Delaware Literary Institute, Franklin, N. Y.

Mr. Beach was in the service of New York State successively as Rodman, from 1869 to 1872, Leveler in 1873, Assistant Engineer from 1874 to 1875, and Assistant Engineer-in-charge from 1876 to 1880. In 1880 he was Assistant Engineer on the West Shore R. R. and in 1881 was Resident Engineer on the West Point residency of that road; the following year he was Assistant Engineer on the Jersey Shore, Pine Creek & Buffalo R. R., now part of the N. Y. Central, and Chief Engineer for the C. B. C. Mining Co. from 1883 to 1886. Mr. Beach was again in the State service as Resident Engineer from 1885 to 1888 and as Division Engineer from 1888 to 1892, retiring to private engineering practice from 1892 to 1896. He was appointed by the City Engineer of Syracuse as Assistant Engineer and served from 1896 to 1901, when he became Consulting Engineer in that Department,—the position he now holds.

BEACH, NELSON J., born Sept. 21, 1800, at Hebron, Conn.; educated at Litchfield, Conn., and at Lowville, N. Y.; died Feb. 22, 1876, at Watson, Lewis county, N. Y.

Mr. Beach's engineering career was begun in the survey of lands for several large land owners in northern New York. The earliest public work that he was engaged on was the survey of a highway through the wilderness, projected to run from Crown Point on Lake Champlain to Carthage, Jefferson county. He was one of the most active citizens favoring the building of the Black River canal and furnished the statistics on which the bill for its construction was based. In 1846, he was elected to the Assembly and in the following year to the Senate, where he was distinguished as an advocate of the resumption of public works. He served as Canal Commissioner in 1848-1849, and in 1850 and 1851 as Canal Appraiser. While Commissioner he rendered efficient service in enlarging the Erie canal. In 1854 Mr. Beach was appointed Vice-President and Superintendent of Construction of the Hudson River R. R., from which position he resigned in 1855 to accept the appointment of Resident Engineer on the eastern division of the New York State canals, remaining on the canal work for two years, when he took charge of the abandoned Rome and Ogdensburg R. R. and closed up its affairs. In 1862 he was appointed by Abraham Lincoln as Assessor of Internal Revenue for the counties of Jefferson, Lewis and Herkimer, continuing in this office for several years. Mr. Beach was appointed Canal Agent in 1873, and only a few weeks before his death prepared an exhaustive report to be embodied in the Canal Commissioner's annual report.

BEHN, J. FREDERICK, born Sept. 18, 1831, at Hamburg, Germany; educated at Polytechnic School, Carlsruhe, Germany, graduating with the degree of Mechanical and Civil Engineer.

Mr. Behn arrived at New York, November 11, 1853, and was Draftsman and Assistant Engineer from April 22, 1854, to March 31, 1856, and from 1860 to 1872 was Assistant Engineer in the New York State canal office at Buffalo. He was Division Engineer of the western division from February 1, 1872, to February 9, 1874. Mr. Behn has now retired from practice.

BISGOOD, JOHN, born in 1823 in Ireland; educated at Maynooth College, Dublin, Ireland; died at Rochester, N. Y., in 1895.

Mr. Bisgood served the State as an engineer for about forty years. He came to America about 1847 and for a few years was Superintendent of some public

improvements at Des Moines, Ia. Later he was employed by the Leighton Bridge Works. In 1850 he was appointed Assistant Engineer on the New York State canals; from 1878 to 1890 he was Resident Engineer on the western division and from 1890 to the time of his death he was Division Engineer on the same division. The only break in Mr. Bisgood's long service on the State canals was during the Civil War, when he was with Company A, Third New York Cavalry.

BOGARDUS, OVA HOYT, born April, 1827, at De Witt, N. Y.; died January 13, 1895.

Mr. Bogardus began work on the New York State canals in 1844 and continued on the work about twenty years. He was connected with the construction of the D. L. & W. R. R., and was later Assistant Engineer on the Chicago and Southern R. R. From the beginning to the close of the work he was on the New York State Triangulation survey. He was employed by the Syracuse Water Board in building the intake works and the State dam at Skaneateles lake, from 1892 to 1894. From this time until his death Mr. Bogardus was again employed on New York State canal work.

BOGART, JOHN, born Feb. 8, 1836, at Albany, N. Y.; educated at the Albany Academy and at Rutgers College, graduating in 1853, with the degree of M. A. Member of the American Society of Civil Engineers; also of Institution of Civil Engineers, London.

During his earlier years Mr. Bogart was engaged as engineer on the New York Central R. R.; he was on the enlargement of the Erie canal of New York State as Second Assistant Engineer from 1856 to 1858; and was Assistant Engineer on the construction of Central Park, New York City. From December, 1861, to July, 1866, he was in engineering service with the U. S. Army. During this time he was stationed at Fortress Monroe and was in charge of the fort at the Rip Raps, Va., besides seeing service at other points. In 1866 Mr. Bogart was Engineer in charge of construction, in 1870 Chief Engineer of the Park Commission of Brooklyn, N. Y., and from 1872 to 1877 was Chief Engineer of the Department of Public Parks, New York City.

Since 1877 he has been engaged as Engineer for many important enterprises, some of the more important being: the municipal works at New Orleans, Chicago, Nashville and Baltimore; designs of the parks at Albany, N. Y., the Public State Grounds at Nashville, the West Side parks of Chicago and the park system of Essex county, N. Y. He was Constructing Engineer of Washington Bridge, New York City; Consulting Engineer of the Niagara Falls Power Co., of the St. Lawrence Power Co., of the Cascade Power Co., B. C., of the Atlantic Electric and Water Power Co., of the Rapid Transit Commission and of the New York State Board of Health.

During 1886 and 1887, Mr. Bogart was Deputy State Engineer of New York under Elnathan Sweet. He was elected to the office of State Engineer and Surveyor of New York in the fall of 1887 and was re-elected in 1889, serving four years. He is now general Consulting Engineer in New York City, and has been Consulting, Advisory or Expert Engineer for a number of railways and in various cases before the Courts. He is a member of various boards; was delegate of the U. S. Government to the Congress of Navigation in Germany, 1902; member of permanent board for U. S. International Navigation Congresses; Lieutenant-Colonel and Chief Engineer of the National Guard of New York.

BOND, EDWARD A., born April 22, 1849, at Dexter, Michigan; educated in the public schools of Michigan and at the Business College of Utica. Member of the American Society of Civil Engineers.

From 1867 to 1870 Mr. Bond was in the employ of the Delaware, Lackawanna and Western R. R. between Utica and Binghamton. In 1875 he was appointed Assistant to Chief Engineer Thomas W. Spencer of the Utica and Black River R. R., whom he succeeded as Chief Engineer upon the resignation of Mr. Spencer, which position he held until 1886. While Chief Engineer, Mr. Bond had charge of the building of the railroad from Louisville to Clayton and Ogdensburg. In 1886 he was appointed Chief Engineer and General Manager of the Carthage and Adirondack R. R. from Carthage to Benson Mines and the Oswegatchie river. Removing to Watertown, N. Y., in 1889, he became a member of the engineering firm of Hinds and Bond, and designed and executed many important engineering and public works in this and other states. Mr. Bond held the office of State

Engineer and Surveyor from 1899 until May 10, 1904, when he resigned to accept his present position, Chairman of the Advisory Board of Consulting Engineers for the improvement of the New York State canals.

**BREVOORT, B. H.**, born in 1847, in the town of East Fishkill, Dutchess county, N. Y.; educated at the Dutchess Academy, and at College Hill, Poughkeepsie, N. Y.

Mr. Brevoort at the age of fifteen was employed as Transitman on preliminary survey for the Boston, Hartford and Erie R. R. In 1867 he was employed on a division of the Croton Aqueduct, Department of New York City; next he was Assistant City Engineer of St. Paul, Minn., and leaving that office, accepted a position with the St. Paul and Chicago R. R. From 1869 to 1874, Mr. Brevoort was Assistant Engineer on the New York State canals. Later he entered the law office of Wm. C. Whitney and was admitted to the bar in 1886 and was afterwards appointed to a position in the office of the Corporation Counsel, from which he resigned to accept a position on the New York Aqueduct. Towards the completion of the work he located at Poughkeepsie and supervised street paving, and while engaged in this work, was appointed Chief Engineer of the Rosendale Water Company, constructing their works. He also made surveys and plans for the waterworks and for a stone arch bridge for F. W. Vanderbilt, of Hyde Park, N. Y. He was chosen Chief Engineer of the Clove Valley R. R., and of the rehabilitating of the Clove Branch R. R.

**BROADHEAD, CHARLES C.**, born Nov. 10, 1772, at New Paltz, Ulster county, N. Y.; died Sept. 10, 1852, at Utica, N. Y.

Mr. Broadhead began surveying under the instruction of W. Cockburn. In 1793 he laid out a large tract of land on the Black river for Desjardins and Pharoux, agents of a French company known as the Castorland Company. In 1816 he was appointed one of the three engineers in charge of preliminary surveys for the Erie canal, and was entrusted with the surveys of the eastern section, extending from Albany to Rome. Mr. Broadhead was one of the Commissioners who in 1817 with Wm. Jones, Morris S. Miller, E. S. Coxler and E. S. Barnum, ran the lines of the town of Utica, when it was set off from Whitestown. After this he retired to private life.

**BROOKS, MELVIN MAIN**, born July 14, 1851, at Clear Creek, Cattaraugus Co., N. Y.; educated at Ellington Academy, Chautauqua Co., N. Y.; died Jan. 11, 1895.

Mr. Brooks' first engineering work was on the Allegheny Valley R. R., begun April 6, 1869. In 1871 he was employed on the Syracuse and Chenango Valley R. R. Later in the year he entered the State service, being appointed Assistant Engineer on the New York State canals in 1874. He resigned from the service of the State during the latter part of 1876 and resumed railroad engineering.

**BROWN, HURLBURT E.**, born July 2, 1831, at Portageville, Wyoming Co., N. Y.; educated at the Nunda Literary Institute, Nunda, N. Y.

Mr. Brown was engaged on the Erie R. R. and held the position of Second Assistant Engineer on the New York State canals from 1852 to 1861.

**BURRUS, CHARLES D.**, born Dec. 13, 1834, at West Troy (now Watervliet), N. Y.; educated at the Rensselaer Polytechnic Institute, Troy, N. Y.

Mr. Burrus was Assistant in the City Engineer's office at Troy, N. Y., from 1856 to 1865. In 1866 he was Draftsman on the New York State canal survey of the upper Hudson and from 1867 to 1869 on the enlargement maps of the Eastern Division; from 1872 to 1873 he was Assistant Engineer, and Division Engineer's clerk from 1874 to 1875; from 1876 to 1878, he was employed in the office of the City Engineer at Albany. In 1879 Mr. Burrus was Assistant Engineer on the Adirondack Survey. From 1882 to 1885, Land Clerk in the State Engineer's office and from 1886 to 1888 Draftsman on maps of lands under water for the Land Commission. In 1890 Mr. Burrus was appointed Draftsman for the Troy Public Works Improvement Commission and served until 1892. The two years following he was Draftsman for the Gravity Supply survey for the Troy Waterways Commission and for the Troy Park Commission. From 1896 to 1900 he was again Draftsman on the New York State canal work and from 1901 to date on maps of lands under water.

**CHILDS, NOADIAH MOODY**, born Dec. 20, 1806, at Stillwater, Saratoga Co., N. Y.; died Nov. 19, 1896, at Syracuse, N. Y.

In 1828 Mr. Childs began his career on the New York State canals, being engaged on the construction of the Oswego canal; in 1829 he was on the Oneida River improvement, and in 1835 on the Chenango canal. He was then appointed Superintendent of the Oswego canal, which office he held until 1839, when he was appointed Resident Engineer on the Erie canal enlargement from Syracuse to Lyons, holding this position until 1841.

CHILDS, ORVILLE WHITMORE, born 1803, at Saratoga Springs, N. Y.; died Sept. 6, 1870, at East Philadelphia, Pa.

Mr. Childs began engineering work as a Chainman in 1820, steadily rising until he became one of the best-known of the early canal engineers. He was Engineer from 1828 to 1838 and Chief Engineer from 1838 to 1849 on the New York State canals, serving upon the construction of the Champlain and Oswego canals and upon the enlargement of the Erie canal, from the commencement to nearly the close of that work, with the exception of a few years, when he was engaged on a survey for a ship canal across the Isthmus of Nicaragua. In 1861 he removed from Syracuse to Philadelphia, Pa., and engaged in the building of sleeping-cars. Soon after his removal Mr. Childs was elected to the presidency of the Central Transportation Railway Company, in which position he remained till the time of his death.

CLARK, FRANK B., born Nov. 4, 1870, at Brookline, Mass.; graduated from Cornell University, receiving the degree of B. S.; died Oct. 29, 1899, in Nicaragua.

For several years Mr. Clark was engaged on the State land survey in northern New York. He was Assistant Engineer on the New York State canals in 1897 and 1898. Retiring from the service of the State, he opened an office at Fulton, N. Y., and a little later received an appointment with the Isthmian Canal Commission, being made chief of his party. He was drowned October 29, 1899, at Machuchu rapids, Nicaragua.

CLAUHARTY, OSCAR M., born Feb. 7, 1829, at Havana (now Montour Falls), N. Y.; educated at Montour Falls, N. Y.; received State Normal School certificate; died June 6, 1899, at Montour Falls, N. Y.

For a time Mr. Clauharty was teacher in the public schools, and in 1861 began work on the New York State canals, being appointed to the position of Assistant Engineer in 1864, and remaining in the Department of the State Engineer and Surveyor until 1870. He next entered the U. S. Custom House at New York City and continued in the service of the Government until his death.

COOPER, JOHN ALDER, born in 1830, at Gloucester, England; educated at Gloucester, England.

Mr. Cooper came to this country in 1854 and entered the Division Engineer's office at Utica as Draftsman, and later became Assistant Engineer, serving as such from 1859 to 1869. In 1872 he was appointed Deputy State Engineer under Wm. G. Taylor, and after the expiration of his term of two years, entered the service of the Central Railroad of New Jersey.

COOPER, WILLIAM BRANTLEY, born Aug. 4, 1830, at Tallahassee, Fla.; educated at Hamilton College, graduating with the degree of A. B.; died Nov. 6, 1886.

Mr. Cooper entered the State Engineer's Department upon graduation, becoming First Assistant Engineer in 1854, and Resident Engineer of the eastern division in 1861. He held this position till 1865, when he went to Mexico and was in charge of the projected Vera Cruz, Mexico City R. R. He returned to the United States about two years later at the death of Emperor Maximilian, and again entered the service of the State, being Assistant Engineer till 1872, when he was appointed Division Engineer of the eastern division, serving as such for three years. Mr. Cooper was the patentee and manufacturer of "Cooper's Tubular Iron Bridges."

CROCKER, E. H., born Oct. 27, 1825, Laurens Co., S. C.; educated at Union College, Schenectady, N. Y., receiving the degree of C. E. and also a classical degree; died Jan. 4, 1897.

Mr. Crocker was Engineer in charge of a division on the construction of the Mobile and Ohio R. R. from 1852 to 1855. He held the position of Second Assistant Engineer on the New York State canals from 1856 to 1859 and 1863, First Assistant from 1860 to 1862 and 1867, and was appointed Division Engineer of the eastern division in 1868, which position he resigned February 2, 1872.

DUNNING, WILLIAM D., born Feb. 11, 1837, at Whitesboro, N. Y.; educated at the Utica Free Academy.

Mr. Dunning began work on the Erie canal at Rome, N. Y., in the spring of 1856 as Axeman under Thomas H. Bates, Resident Engineer; in the same year he was transferred to the Black River Improvement under E. W. Butler, Resident Engineer, and promoted to the rank of Rodman. In 1857 he was transferred to the Division Engineer's office at Albany, remaining until 1864, when he went to Syracuse on the middle division. From 1863 till 1874 he was an Assistant Engineer, but left the State's employ at the end of that time to engage in his present foundry business at Syracuse.

EVERSHED, THOMAS, born Feb. 30, 1817, in Sussex, England; died Feb. 9, 1890.

Mr. Evershed came to this country in early youth and was soon afterward engaged upon the enlargement of the Erie canal. In 1849 he went to California and while there built a levee around the City of Sacramento in addition to constructing other works in California. On his return to the East he was engaged on the construction of the Rochester and Niagara Falls R. R., on the Erie canal, and also on the Grand Trunk R. R. in Canada, where, together with other works of importance, he built the celebrated high bridge across the Credit Valley. Returning to the United States, he was engaged in many railroad enterprises as engineer and contractor.

He was Assistant Engineer on the New York State canals in 1871, 1872 and 1875, Resident Engineer in 1862 and 1877, and in 1878 was appointed Division Engineer on the western division of the canals, retaining this office until his death. Mr. Evershed was the originator of the great Hydraulic Tunnel of Niagara falls. He was an artist of considerable talent and won many commendations for his paintings.

FARNUM, HENRY HARRISON, born May 10, 1808, at Litchfield, Conn.; educated at Albany Academy; died Oct. 11, 1879, at Port Jervis.

Mr. Farnum began engineering on the construction of the Delaware and Hudson canal and upon its completion was appointed Superintendent of the section which he had helped to build. Later he was appointed Assistant Engineer and remained with the company until 1838. From 1839 to 1843 he held the position of Resident Engineer on the New York State canals.

FAY, JOHN DOANE, born April 20, 1815 at Northampton, N. Y.; educated at Lowville, N. Y.; died June 6, 1895 at Rochester, N. Y.

At an early age Mr. Fay was associated with his brother-in-law, Alanson Sumner, and Hon. Stephen Clark of Albany, in constructing the Long Bridge over the Potomac. He was Resident Engineer on the New York State canals from 1841 to 1849. With O. W. Childs, in 1850, he was sent by Commodore Vanderbilt to make a survey for the proposed Nicaragua canal, which survey occupied one and one-half years. Mr. Fay held the office of Division Engineer on the western division of the State canals from 1852 to 1853, 1856 to 1860, and 1874 to 1875. From 1867 to 1873 he held the office of Canal Commissioner. He made the survey for the direct line of railroad from Rochester to Syracuse, and also made surveys for several railroads in the West.

FISHER, CHARLES HENRY, born June 10, 1835, at Lansingburg, Rensselaer County, N. Y.; died Jan. 18, 1888. Member of the American Society of Civil Engineers.

Mr. Fisher was educated at the Lansingburg Academy and afterwards took a partial course at the Rensselaer Polytechnic Institute at Troy, receiving the honorary degree of C. E. in June, 1882, in recognition of his successful service for nearly thirty years on the New York Central R. R. In 1853 he was employed on the Racine, Janesville and Milwaukee R. R.; from 1854 to 1857 on the enlargement of the Erie canal, being Second Assistant Engineer in 1856 and 1857. In 1858 Mr. Fisher became Principal of the Lansingburg Academy. Resigning in 1859 he was appointed Chief Engineer of the New York Central R. R. and served till 1868. In 1869 he became Chief Engineer of the Oswego and Lake Ontario Shore R. R., which position he held until January, 1869, when he was again appointed Chief Engineer of the New York Central R. R. In 1885 the company retired him on half pay, although he remained nominal Chief Engineer until his death. While in charge of this road the two additional tracks from Albany to Buffalo, the Geneva and Lyons R. R., the Syracuse Junction R. R., and the Buffalo Junction R. R., the depots at

Albany, Syracuse, Rochester and Buffalo, the Buffalo Stock Yards, the De Witt yards and shops and the Broadway crossing in Albany were constructed. Mr. Fisher was also Consulting Engineer for the Cantilever Bridge at Niagara.

FULLER, CHARLES L., born Sept. 16, 1830, at Ballston, N. Y.; studied engineering with his father, Col. Wm. Fuller; died Sept. 14, 1901.

Mr. Fuller removed from Ballston to Troy in 1851 and was in the employ of Wm. Barton. He entered the employ of Benjamin Turner, City Engineer of Troy, two years later. In 1856 he was Second Assistant Engineer on the New York State canals. He served three times as City Engineer of Troy, first, from 1859 to March, 1870; second, from May 1870 to 1875 and third from Nov. 1883 to June 1892. He was also Consulting Engineer for Cohoes, Watervliet, Lansingburg, Waterford and Green Island.

GEDDES, GEORGE, born at Fairmount, Onondaga Co., N. Y., Feb. 14, 1809; graduated at the Middletown, Conn., military school; died Oct. 8, 1883; son of James Geddes, the engineer making the first surveys for the Erie canal.

Although Mr. Geddes studied law, he did not apply for admission to the bar, preferring the profession of civil engineering. Among his first positions was that of Consulting Engineer on the Syracuse and Oswego railroad. In 1851, he made a survey, for the State, of the Cayuga marshes and in the next few years he made plans and had charge of the work of draining these marshes. He also made a geological survey of Onondaga county, built reservoirs in Syracuse and elsewhere, and devoted much time and study to investigating the subject of steam as a motive power on the canals. He engaged in various engineering enterprises in New York and other cities, and was an original member of the State Survey Commission, which position he filled until his death.

GEDDES, JAMES, born July 22, 1763, near Carlisle, Pa.; received his education in mathematics under a Mr. Oliver; died Aug. 19, 1838, at Geddes, N. Y.

In 1808 Mr. Geddes was intrusted by the Surveyor-General of New York State to explore the line of the proposed canal, and from that time till near the close of his life he was more or less continuously employed on the State canals. In 1816 he was appointed Engineer upon the Erie canal to take charge of the preliminary surveys from the Seneca river to within eleven miles of the mouth of Tonawanda creek; a year later he was directed to superintend the location of the middle division between Rome and Utica and was made Chief Engineer of the Champlain canal. Mr. Geddes was employed in 1822 by the State of Ohio to make the survey for a canal from the Ohio river to Lake Erie, and a year later was called by the State of Maine to survey the route of a canal from Sebago pond to tide-water at Westbrook. In 1827 he was employed by the General Government (associated with Mr. Roberts) in the location of the Chesapeake and Ohio canal and in 1828 was engaged upon the canals of Pennsylvania.

GERE, W. H. H., born Aug. 14, 1829, in Onondaga Co., N. Y.; educated at Syracuse and Homer.

Mr. Gere's connection with the State canals covers one of the longest periods on record, extending from 1848 to 1904, but his actual employment on the work was for about half of that time. During this period he was associated with much important work, gaining an enviable reputation early in his career by his construction of the Montezuma aqueduct. He was Second Assistant Engineer in 1851 and 1852, Assistant Engineer in 1854 and 1855, Resident Engineer in 1855 and 1856 on the western division, and from 1860 to 1866 on the middle division, Division Engineer from 1866 to 1868 and from 1894 to 1904 on the middle division. Besides his services for the State, he was employed by the Erie R. R. on the work of building double tracks from Deposit to Susquehanna; on the Great Western R. R., Suspension Bridge to Hamilton; on the original surveys of the Syracuse and Binghamton R. R., and he was for two years City Engineer of Syracuse. Since 1904 he has retired to private life.

GOODSELL, J. PLATT, born at Utica, Oneida Co., N. Y.; educated at the Utica Academy, completed studies in Mass.; died Nov. 1869. Member of New York State Institute of Civil Engineers.

Mr. Goodsell was first employed by the State under Holmes Hutchinson, on the enlargement of the Erie canal in 1840. He was appointed Second Assistant Engineer

to 1846, and from 1850 to 1853 held the position of Resident Engineer. From 1853 to 1856 he was Chief Engineer of the Cape Fear and Deep River R. R. of North Carolina. From 1856 to 1860 Mr. Goodsell was Division Engineer on the eastern division of the New York State canals and from 1862 to 1866 held the same office on the middle division. Mr. Goodsell was elected State Engineer and Surveyor of New York State in the fall of 1865 and held office during 1866 and 1867.

GOODSELL, THOMAS, born at Whitestown, Oneida Co., N. Y.; educated at the Utica Academy; prepared for college at the Clinton Academy; died Sept. 1901, more than eighty years of age.

Mr. Goodsell's services on the canals of New York State were in the positions of Second Assistant Engineer, 1850 to 1852; First Assistant, 1855 to 1859; Second Assistant, 1860 and 1864; Assistant, 1867 to 1871; Resident Engineer of the middle division, 1872 to 1874; and Assistant again in 1875. He was also City Engineer of Syracuse; Resident Engineer on the Cape Fear and Deep River R. R. of North Carolina; Engineer and Manager of the Mariposa gold mine of California and of the Miridota copper mine of Lake Superior.

GRAY, GEORGE EDWARD, born Sept. 12, 1818, at Verona, Oneida Co., N. Y.; educated in the common schools and under private tutor. Honorary Member of American Society of Civil Engineers. Life Member of The Institute of Civil Engineers, London, Eng.

Probably Mr Gray's connection with the New York canals dates back farther than any other engineer now living. He commenced his engineering career on the Black River canal of New York in 1839. From 1850 to 1853 he was Assistant Engineer on the New York State canals. During his early years Mr. Gray held the positions of Assistant Engineer on the construction of the New York and Harlem R. R. from White Plains to Dover Plains, on the Utica and Schenectady R. R., and on the Mohawk Valley R. R. From May, 1853, to May, 1865, he was Chief Engineer of the New York Central R. R. and has also been Chief Engineer of the Albany bridge; Consulting Engineer of the Central Pacific R. R. of California; Chief Engineer of the Southern Pacific R. R. of California, Arizona and New Mexico, and of the Galveston, Harrisburg and San Antonio R. R. to El Paso, Texas. He is now a consulting engineer at San Francisco, Cal.

GREENE, DAVID MAXSON, born July 8, 1832, in Brunswick, Rensselaer County, N. Y.; educated at the district schools, Adams Seminary and at the Rensselaer Polytechnic Institute, at Troy, N. Y., graduating in 1851 with the degree of C. E.; died November 9, 1905, at Adams, Jefferson County, N. Y. Member of the American Society of Civil Engineers, the American Society of Naval Engineers, the Society of Naval Architects and Marine Engineers, the American Association for the Advancement of Science, the International Association of Navigation, and a number of others.

Immediately upon graduation Mr. Greene was appointed Assistant Instructor and later Professor of Geodesy and Topographical drawing in the Institute. He resigned his position in the spring of 1852, having been appointed Chairman on the enlargement of the Erie canal. In September, 1853, he was engaged as Assistant and as Division Engineer on railroads in Ohio and Indiana. On account of illness he returned east in 1854, and in 1855 again became an instructor in the Rensselaer Polytechnic Institute. In 1861 he was appointed Third Assistant Engineer in the U. S. Navy, where he participated in several engagements and was also, during his term of service, Assistant Professor of Natural and Experimental Philosophy and Instructor in Steam Engineering at the U. S. Academy at Newport. Resigning from the Navy in 1869, he returned to Troy and engaged in general engineering practice. About 1871 he was elected Engineer of the New York State Commission to test devices to substitute steam for animal power on the canals. In January, 1874, Mr. Greene was appointed Division Engineer of the eastern division of the canals and in July of the same year was appointed Deputy State Engineer, holding office until 1877, when he again returned to Troy and resumed general practice. In August, 1878, he was elected a Director of the Rensselaer Polytechnic Institute, which position he held until he resigned in 1891. During that time he was engaged in general engineering practice extending through eleven States, the District of Columbia and Canada and served as an expert witness on hydraulic and steam engineering in various courts. Mr. Greene was the author of a number of text books pertaining to his profession.



HALL, GEORGE THOMAS, born April 6, 1845, at Malta, Saratoga Co., N. Y.; graduated from Rensselaer Polytechnic Institute at Troy in 1868, with the degree of C. E.; died June 2, 1881, at New York City. Member of American Society of Civil Engineers.

Mr. Hall commenced his engineering career as Transitman on the New York, New Haven and Willimantic R. R. under George E. W. Serrel, Chief Engineer. He left this company to go to Canada, where he held a responsible position in the building of one hundred and eighty miles of the North Shore R. R. Returning to the United States, he was appointed Chief-of-Corps on the West Shore R. R. under General Stuart. Later he was engaged in making the first surveys for the Gilbert Elevated R. R. Mr. Hall was appointed Assistant Engineer on the Champlain canal, holding the position from 1874 to 1876. At the end of his association with State work he went to New York as Division Engineer of the Manhattan Elevated Railway Company, retaining this position until his death.

HANKS, BYRON MURRAY, born May 29, 1826, at Henrietta, Monroe county, N. Y.; educated at Monroe Academy, Genesee Wesleyan Seminary and Dartmouth College, graduating from Dartmouth in 1849 and receiving the degree of M. A. several years later; died May 21, 1877, at Albion, N. Y.

Mr. Hanks began his engineering career on the Genesee Valley canal, and later studied law with J. D. Husbands, of Rochester, being admitted to the Bar in 1852. He removed to Fond du Lac, Wis., where he remained one year and then resumed engineering in the employ of the Covington and Louisville R. R. Returning to Rochester in 1855, he reentered the service of the State, holding the positions of Second Assistant Engineer in 1855, First and Second Assistant in 1856, First Assistant from 1857 to 1860, and Resident Engineer on the Chenango canal extension from 1866 to 1868. He was Resident Engineer on the western division of the Erie canal from 1872 until his death and was Acting Division Engineer for a time in 1875.

HARTWELL, DANIEL R., born in 1816, at Stillwater, Saratoga Co., N. Y.; educated at the Lansingburg Academy, Lansingburg, Rensselaer Co., N. Y.; died Feb., 1903, at Saranac, Mich.

Mr. Hartwell entered the State canal service in the early 'forties. He was Second Assistant Engineer 1850-53, First Assistant 1854-59, and Second Assistant again in 1860. After leaving the canals, he removed to Michigan where he was engaged in farming for many years.

HARTWELL, ORVILLE C., born in 1813, at Stillwater, Saratoga Co., N. Y.; educated at the Jonesville Academy, Jonesville, Saratoga Co., N. Y.; died Sept. 15, 1859, at Saranac, Mich.

Mr. Hartwell began work on the New York State canals about 1840. While in this service he was First Assistant Engineer 1850-52, Resident Engineer 1852-54, and Division Engineer 1856-57, all on the middle division. In 1854 he was Chief Engineer of the Southern Central R. R.—at that time called the Lake Ontario, Auburn and New York R. R. After leaving the State work, he removed to Michigan, where he soon died.

HARTWELL, REUBEN A., born in Saratoga Co., in 1835.

In 1853 Mr. Hartwell was Chainman on the Auburn, Sodus Bay and Ithaca R. R., and in 1856 was Rodman on the Fayetteville and Orville feeders, middle division, Erie canal. Later he was transferred to the Erie canal, being on a section from Higginsville to Chittenango, and in 1858 he served as Transitman with a final survey party, Charles Truesdell in charge. In 1859 he went west. Returning to New York State, he was appointed Leveler on the Chenango canal extension in 1864, resigning this position in 1867 to accept one as Assistant in charge of a division of the B. H. E. R. R. In 1870 he was Transitman on the Owasco lake survey and after its completion he went west again; in 1881 he was in the employ of the B. H. E. R. R. In 1882 he became an Assistant Engineer on the Champlain canal, continuing there during Silas Seymour's term of office, and in 1895 he received the appointment of inspector on contract No. 24, at Mohawk, of the \$9,000,000 improvement.

HASBROUCK, ROBERT M., born 1824, at Albany, N. Y.; educated at Lafayette College, Easton, Pa.; received the degree of A. M. and C. E.; died in 1887.

Mr. Hasbrouck began his work as a civil engineer on High Bridge at New York City and followed his profession continuously until his death. In 1875 he held the position of Assistant Engineer and in 1884 of Division Engineer on the eastern division of the New York State canals. For nearly eleven years Mr. Hasbrouck was City Engineer of Troy, N. Y.

HERSEY, JOHN C., born Aug. 26, 1847, at Lowell, Mass.; educated at Sheffield Scientific School, Yale University, receiving the degree of B. S. Member of the American Society of Civil Engineers until compelled by ill health to give up scientific work.

Mr. Hersey was Assistant Engineer on exploration and construction of the Northern Pacific R. R. and on preliminary survey, location and construction of the Ware River R. R., now a branch of the Boston and Albany. From 1872 to 1876 he was Assistant Engineer on the New York State canals and later was Engineer for contractors on the Welland canal construction. Being incapacitated for active work by a stroke of paralysis Mr. Hersey entered the Customs Department of the United States and for a number of years has been Chief Clerk in charge of a division and Acting Deputy Naval officer.

HUTCHINSON, HOLMES, born January 5, 1794, at Port Dickinson, Broome Co., N. Y.; died suddenly February 21, 1865, at Utica, N. Y.

Mr. Hutchinson was appointed an Engineer on the Erie canal of New York State in 1819. He held this position until 1835, when he was made Chief Engineer, performing the duties of this office during the enlargement of the canal, until 1841. He surveyed and made the original "blue line" maps for the Erie, Champlain, Oswego, Black River, Chenango, Crooked Lake, and Chemung canals. The Chemung canal was completed under Mr. Hutchinson's direction for an amount less than his estimates. His plans for locks on the Chenango and on the enlarged Erie were used in their construction. He had charge of the Cumberland and Oxford canals in Maine, and of the Blackstone in Rhode Island and Massachusetts, and was frequently employed in locating and defining valuable tracts of land in Oneida and other counties of New York State. In 1825 Mr. Hutchinson was engaged as Chief Engineer by the Connecticut River Company, upon the recommendation of Gov. De Witt Clinton of New York, to survey a route of water communication from Barnet, in the State of Vermont, to the City of Hartford, Conn., a distance of two hundred and nineteen miles. He was one of the directors of the Utica and Syracuse R. R. until its consolidation with the New York Central R. R.; he was also a director of the Syracuse and Oswego R. R., of which he was for some years President, and had a managing interest in the Ontario and St. Lawrence Steamboat Company, and in the Bank of Utica.

JERVIS, JOHN BLOOMFIELD, born Dec. 14, 1795, at Huntington, L. I.; died Jan. 12, 1885, at Rome, N. Y. Member of American Society of Civil Engineers.

Mr. Jervis began his career in 1817 under Benjamin Wright on the Erie canal and in 1819 was promoted to the position of Resident Engineer, remaining on the canal till near its completion. He served as Assistant Engineer with the Delaware and Hudson Canal Co. in 1825 and became Engineer-in-Chief in 1827. In 1830 he was appointed Chief Engineer of the Albany and Schenectady R. R. and later of the Schenectady and Saratoga R. R., retiring to accept a position as Chief Engineer of the Chenango canal. In 1835 he made preliminary surveys and estimates for enlarging the Erie canal. Mr. Jervis became Chief Engineer of the Croton aqueduct in 1836; in 1846 he was Consulting Engineer of the Cochituate Water Works; in 1847 he was made Chief Engineer of the Hudson River R. R.; in 1850 of the Michigan Southern and Northern Indiana R. R.; in 1851 Engineer of the Chicago and Rock Island R. R., and in 1854, its President. He returned to Rome in 1858 and lived a retired life for three years, from which he emerged to become Superintendent and Engineer of the Pittsburg, Fort Wayne and Chicago R. R. Retiring in 1866 from active railroad management, Mr. Jervis aided in organizing the Merchant Iron Mill at Rome in 1868. In 1872 he was elected Secretary and held the office of Trustee of this company until death.

JUDAH, THEODORE DEHONE, born March 4, 1828, at Bridgeport, Conn.; educated at Rensselaer Polytechnic Institute, Troy, N. Y.; died Nov. 2, 1863, at New York. Member of American Society of Civil Engineers.

Mr. Judah's first work was under S. W. Hall, Engineer of the Troy and Schenectady Railroad Co. He afterwards was engaged, under James Laurie, on the New York,

New Haven, Hartford and Springfield R. R., and on the Connecticut River R. R. In 1850 Mr. Judah was appointed First Assistant Engineer on the middle division of the New York State canals and served until 1852; later he was Engineer of the railroad down the gorge of the Niagara river to Lewiston, a work that was considered a remarkable feat in those days and resulted in his engagement as Chief Engineer of the first California railroad—the Central Pacific. It was on this railroad that he achieved his greatest reputation, not only as an engineer but also as a promoter. At the time of his engagement with the Central Pacific R. R. he was in the employ of the Buffalo and New York R. R.

**KALEY, JOHN R.**, born at Albany, N. Y.; graduated from Rutgers College, New Brunswick, N. J., in 1870; took special course at Rensselaer Polytechnic Institute, Troy, N. Y., class of 1873.

In 1873-4 Mr. Kaley was Leveler on construction of the four tracks, N. Y. C. & H. R. R. R. In 1875 he entered the New York State service as Chainman; he was soon promoted to Rodman and in 1876 to Assistant Engineer, acting as such till 1880. In 1880 he was on construction work on the Texas Pacific R. R., and in 1882-3 was employed as Engineer in charge of constructing dam, canal and foundations for the Hudson River Water Power Co., at Mechanicville, N. Y. In 1884 he again entered the State service, being Assistant Engineer, Resident Engineer (acting) and Division Engineer on the eastern division till 1888. In 1889 he was Special Agent in the State Department of Public Works; in 1889-90 Assistant Engineer and Engineer-in-charge for the Troy Public Improvement Commission; in 1891 making survey and estimates for a railroad from Canaan, Conn., to Mill River, Mass.; and in 1891-2 member of the Troy Engineering Co.

From 1892 till the present time Mr. Kaley has been connected with the State engineering department, serving as Assistant Engineer in 1892-6 and 1903-4, as First Assistant in 1897-1902 and as Resident Engineer since 1904. Nearly all of Mr. Kaley's work on the canals has been in the eastern division, especially along the Champlain canal.

**KELLY, JOHN P.**, born Aug. 10, 1854, at Troy, N. Y.; educated at Rensselaer Polytechnic Institute, graduating with degree C. E.; died Sept. 24, 1898.

Shortly after Mr. Kelly's graduation he became Assistant City Engineer of Troy which position he held for two years; he then became Assistant Engineer in the Federal employ at Clarendon on the White river, and later became U. S. Department Surveyor. After several years in the West he returned East and entered the service of New York State, being an Assistant Engineer from 1886 to 1888, Resident Engineer of the eastern division from 1888 to 1891, and Division Engineer of the same division from 1891 to 1894. After leaving the State service Mr. Kelly became interested in contract work.

**KIMBALL, BRUCE JEROME**, born March 21, 1828, at Rutland, Jefferson Co., N. Y.; educated at the Watertown Academy; died March 4, 1891, at Fulton, Oswego Co., N. Y.

At the age of nineteen Mr. Kimball began the study of engineering under the direction of his brother, Morris S. Kimball, at Fulton. With the exception of about six years, he was connected with the Oswego canal in various positions from 1847 to 1876, being Assistant Engineer from 1871 to 1876.

**KIMBALL, MORRIS SYLVESTER**, born April 25, 1815, at Rutland, Jefferson Co., N. Y.; educated at Rutland and Watertown; died Oct. 26, 1875.

Mr. Kimball entered the employ of the State in 1836, at the age of 21, and continued in its service, with the exception of less than a month, to the day of his death. He held the position of First Assistant Engineer from 1850 to 1851; Resident Engineer from 1851 to 1863; Assistant Engineer from 1863 to 1868 and from 1872 to 1875; Division Engineer from 1868 to 1872, most of the time on the middle division. His first work was on the Genesee canal, next on the Chenango canal, but the greater part of his work was connected with the Oswego canal, where the good condition of the locks and dams still attests his care and ability as an engineer.

**LASHER, WINFIELD SCOTT**, born Nov. 22, 1849, at Germantown, N. Y.; graduated from Rutgers College in 1871; died Oct. 16, 1899, in New York City.

Mr. Lasher was employed on the New York State canals from 1872 to 1882, being Assistant Engineer from 1876 to 1878, Resident Engineer of the eastern division

from 1878 to 1880, and Division Engineer of the same division in 1880 and 1881. Afterward, for a period of twelve years, he was one of the Assistant Engineers in the Dock Department of New York City.

LATIMER, EDEN BYRON, born May 2, 1833, at Amenia, Dutchess Co., N. Y.; educated at Poughkeepsie, N. Y.; died March 7, 1891.

Mr. Latimer served as Second Assistant Engineer on the Erie canal from 1854 to 1857. At a later date he was employed upon railroad construction in central New York, but his health failing he was finally compelled to give up engineering.

LEDLIE, JAMES HEWETT, born April 14, 1832, at Utica, N. Y.; educated at Union College; died August 15, 1882, at New Brighton, Staten Island.

Gen. Ledlie served on the New York State canals as Second Assistant Engineer in 1854 and First Assistant during 1855 and 1856. At the beginning of the Civil war, he was commissioned Major of the 19th New York Infantry, which in the autumn of 1861 became an artillery regiment. In 1862 he was made Chief of Artillery on the staff of Gen. John G. Foster and on December 24, was promoted to Brigadier-General of Volunteers. Declining a commission in the regular army, he resigned from the volunteers on January 23, 1865, to reenter his profession, taking the entire contract for the construction of bridges, trestles and snow-sheds on the Union Pacific R. R. At a later date he built the breakwater of Chicago harbor and was engaged in railroad construction in the West and South. At the time of his death Gen. Ledlie was Chief Engineer of railways in California and Nevada and President of the Baltimore, Cincinnati and Western Railroad Construction Co.

LEUTZÉ, TREVOR MCCLURG, born at Dusseldorf, Germany, in 1851; died at Albany, N. Y., October 14, 1901. Member of the American Society of Civil Engineers.

Coming to America at an early age, Mr. Leutzé engaged in civil engineering. In 1886 he became connected with the New York State engineering department, being an Assistant Engineer from 1887 to 1895, First Assistant from 1896 till April 1, 1899, when he was appointed Division Engineer of the eastern division continuing in that position until his death. From April, 1900, to February, 1901, he served also as one of the two Consulting Engineers in directing the preliminary surveys for the Barge canal.

LIGHTHALL, JOHN A., born Sept. 8, 1833, at Albany, N. Y.; educated at the Albany Academy.

Mr. Lighthall began work on the New York State canals in 1850, but resigned in 1852 to take a position on the construction of the Illinois Central R. R. He was also engaged on the preliminary survey of what is now the line of the New York, Ontario and Western R. R. In 1853 and from 1854 to 1855 he was engaged in the construction of the second track of the direct line of the N. Y. C. R. R., from Syracuse to Rochester. Mr. Lighthall returned to the service of the State in 1855, being Second Assistant Engineer from 1855 to 1857 and First Assistant in 1857 and 1858. He had charge of the work on the Cayuga and Seneca canal through Seneca Falls and at the foot of Cayuga lake until 1858, when the work was stopped for lack of funds. Mr. Lighthall then resigned his position and went into business in Chicago. He is now engaged in business at Syracuse, N. Y., where he has been for many years.

LUDDINGTON, EDSON L., born 1844, at De Witt, Onondaga Co., N. Y.; graduated from San Jose Institute, California, with the degree of C.E.; died July 15, 1885, at Tower, Minn.

Mr. Luddington was Assistant Engineer on the canals of New York State from 1868 to 1875. In 1875 he was appointed City Engineer of Syracuse, N. Y., and served until 1882. For two years Mr. Luddington held an appointment under the U. S. Government and was engaged at various times in surveys of public lands in Arizona, Minnesota and Dakota.

MCALPINE, CHARLES LEGRAND, born ———, Albany, N. Y.; educated at Albany Academy; died January 11, 1884, in New York City. Member of the American Society Civil Engineers.

For many years Mr. McAlpine was in the engineering department of the State of New York and filled various positions of responsibility in the reconstruction and enlargement of the Erie and other canals of the State. From 1869 to 1871 he held the position of Resident Engineer, being in charge of the construction of the Chenango

canal extension. He was also in charge of the construction of several railroads, and his last active work was the direction of location and construction of the Albemarle and Raleigh Railroad in North Carolina, now a part of the Atlantic Coast line.

**MCALPINE, WILLIAM JARVIS**, born April 30, 1812, at New York City; died February 16, 1890. Member of the American Society of Civil Engineers. First American elected to membership in the Institution of Civil Engineers of Great Britain. A member of the New York Chamber of Commerce and of nearly all the scientific societies in America.

In 1827 Mr. McAlpine began civil-engineering as a pupil of John B. Jervis, with whom he remained until 1836. While with Mr. Jervis, he was Assistant Engineer on the Mohawk and Hudson R. R. and the Schenectady R. R. from 1830 to 1831, and for the St. Lawrence Improvement Company in 1832. From 1833 he was engaged on the Chenango canal and the enlargement of the Erie canal, and succeeded Mr. Jervis as Chief Engineer of the eastern division of the New York State canals, holding the position of Resident Engineer from 1838 to 1846. From 1846 to 1849 he was Chief Engineer of the dry dock at the Brooklyn navy yard; he also designed and built the Albany water works in 1850 and 1851, and the Chicago water works from 1851 to 1854.

Mr. McAlpine was elected to the office of State Engineer and Surveyor of New York State in the fall of 1851 and continued in office until August 1, 1853. From 1850 to 1857 he served as Railroad Commissioner. On his retirement from this office he became Chief Engineer and Assistant to the President of the Erie R. R., resigning from this position to accept an appointment as Chief Engineer and Vice-President of the Galena and Chicago R. R. He was also a member of the Board of Engineers which reported on the improvement of Montreal harbor and in 1860 he became Chief Engineer of the Third Ave. bridge over the Harlem river in New York City. From 1860 to 1886 he was engaged on many important public works consisting principally of railroads, bridges and city water-supply systems.

**MILLS, FREDERICK C.**, born Nov., 1804, in Saratoga Co., N. Y.; received his education in the Public Schools; died in 1850.

Mr. Mills was engaged on the New York, the Pennsylvania and the Delaware canals. He was Engineer on the New York State canals from 1830 to 1835, and Chief Engineer from 1835 to 1843, making the preliminary surveys on one division for the Erie canal enlargement, besides doing other important work in connection with this and the lateral canals that were being built during his service with the State.

**MILLS, HIRAM P.**, born Jan. 2, 1806, in Saratoga Co., N. Y.; educated in the Public Schools; died Jan. 6, 1902, at Mt. Morris, N. Y.

Mr. Mills held the position of Resident Engineer on the New York State canals from 1837 to 1842.

**MORSE, JAMES OTIS**, born 1818, at Cherry Valley, N. Y.; graduated from Hamilton College, 1836; died March 8, 1883. Member of the American Society of Civil Engineers.

Mr. Morse's first engineering work was on the Genesee Valley canal and later he was on the Utica division of the enlargement of the Erie canal, holding office as Resident Engineer in 1848. He was employed on the location of the New York and Erie R. R. between Port Jervis and Binghamton; was First Assistant to W. J. McAlpin in building a dry dock at the Brooklyn navy yard, which was completed in 1851; and in building the Savannah water works. Mr. Morse purchased the business of Walworth, Nason and Guild, 76 John Street, New York City, and continued the engineering department of this business in connection with that of heating and ventilating. Among the works constructed under his superintendence were the pipe bridge at the Croton dam, the Watertown gasworks, the Willoughby street bridge, Brooklyn, and the Spring street bridge, Saratoga.

**NEARING, W. SCOTT**, born Oct., 1829, in Onondaga Co., N. Y.; educated in the town of Clay, Onondaga Co.

In the spring of 1848 Mr. Nearing began his career as Chainman on Surveys for a railroad from Syracuse to Rochester, and from 1849 to 1852 he was Surveyor for a proposed railroad fromodus Bay to Auburn and Binghamton. He entered the State Engineer's department in 1849 and served on the New York State canals in the Syracuse office until 1852, when he resigned his position as Second Assistant

Engineer to act as Assistant Engineer on the Syracuse and Binghamton Railroad and from 1853 to 1854 on the Utica and Black River R. R. He returned to the service of the State and served as First Assistant Engineer on the Erie canal between Canajoharie to Herkimer, from 1854 to 1856, when he again resigned and served on the improvement of Fox and Wisconsin rivers, Wisconsin, from 1856 to 1859. From January, 1864, to the present time, Mr. Nearing has been Superintendent of the coal mines at Morris Run, Pa., and during the years of 1883, 1884 and 1885, was Chief Engineer on the building of the Beech Creek, Clearfield and Southwestern R. R.

**NEWKIRK, WILLIAM H.**, born March 17, 1842, at Amsterdam, N. Y.; received his education at an Academy and at a private school.

From 1860 to 1861 Mr. Newkirk was engaged on the Erie canal as Rodman. Leaving the service of the State, he was employed on the survey, estimates, etc., of the Albany and Troy Horse R. R. in 1862; in the engineering department of the New York Central R. R. in 1863, and on the improvement of the Mexican railroad between Vera Cruz and the City of Mexico in 1865. From 1868 to 1871 he was in the Division Engineer's office at Albany, from which he was transferred to the Erie canal office at West Troy, being Assistant Engineer from 1873 to 1874. Mr. Newkirk was with the U. S. Engineering Department under Gen. Willson at Oswego in 1874. He has also been engaged on estimates for proposed N. Y. State ship canals, on the New York Central R. R. between Rochester and Buffalo, on the West Shore R. R., on a railroad in Kentucky, and in private work in Syracuse and other places.

**NORTHWAY, WILLIAM RUFUS**, born Nov. 3, 1834, at Utica, N. Y.; educated at Union College, Schenectady, N. Y., graduating with the degree of C. E. Member of American Society of Civil Engineers and of Western Society of Engineers.

Mr. Northway was engaged on the Black River and Utica R. R. from 1853 to 1854, resigning to accept an appointment as Assistant Engineer on the New York State canals, from which he retired in 1857 to serve with the Dubuque and Pacific R. R. In 1858 and 1859 he was on the Hannibal and St. Joseph R. R. From 1861 to 1867 he was Engineer in the Quartermaster's Dept. of the U. S. Army. Retiring from the army in 1867, he was employed on the Missouri, Kansas and Texas R. R., until 1871. In 1872 he was in charge of the double-tracking of the Mexican Central R. R. and in 1873 was employed on the New York Central R. R. From 1874 to 1876 Mr. Northway was engaged on the construction of the Rochester, N. Y., waterworks; from 1878 to 1879 on the Wabash R. R.; and from 1880 to 1890 with the City Engineering Dep't of Chicago, serving three years of this time as City Engineer. The most of the time from 1890 to 1898 he spent in private practice and from 1898 to the present time has been with the Engineering Dep't of Chicago.

**NORTON, JOHN V.**, born Nov. 7, 1840, at Plainville, Onondaga Co., N. Y.; graduated from Union College in 1862 with the degree of C. E.; died Feb. 11, 1879.

In 1863-4 Mr. Norton was in the army as Assistant Paymaster. In 1870 he was appointed Assistant Engineer on the middle division of the New York State canals, from which he retired in 1872 to go to Peru with Chas. A. Sweet, and engage in the construction of the Simond Oroya railroad up the Andes mountains. Mr. Norton returned to the United States in 1873 and was reappointed Assistant Engineer on the New York canals in 1875, serving as such until 1876. In 1878 Mr. Norton went to Rio de Janeiro, Brazil, to construct a large dry dock. He contracted yellow fever and died while engaged in this work.

**PARKER, ELY SAMUEL**, born 1828, on the Indian reservation at Tonawanda, N. Y.

Mr. Parker was a full-blooded Seneca Indian and was Chief of the Six Nations. After receiving a thorough common-school education he took a course in civil engineering and removed to Galena, Ill., where he formed an intimate personal acquaintance with Ulysses S. Grant. He was in the service of the eastern and western divisions of the New York State canals, as Second Assistant Engineer from 1850 to 1851 and First Assistant from 1851 to 1855. After the Civil war broke out, he joined the Federal forces, becoming a member of Gen. Grant's Staff, and was appointed Asst. Adjutant-General with the rank of Captain in May, 1863; subsequently he acted as Secretary to Gen. Grant until the close of the war. While serving as Secretary, he was present at Lee's surrender and prepared the first engrossed copy of the terms of capitulation. After the close of the war, 1866, he received a commission as First Lieutenant U. S. Cavalry and was promoted through the several

grades until he became Brigadier General of the United States Army, March 2, 1867. Resigning in 1869, Gen. Parker was appointed Commissioner of Indian Affairs, from which he retired in 1871 to resume his profession of civil engineering.

**PERKINS, GEORGE ROBERTS**, born, May 3, 1812, Otsego Co., N. Y.; died Aug. 22, 1876, at New Hartford, Conn.

Mr. Perkins was self-educated. In 1830 he was employed on the slack-water survey of the Susquehanna river. He was teacher of mathematics at Clinton, N. Y., from 1831 to 1838, when he became Principal of Utica Academy. On the opening of the New York State Normal School in 1844, he was chosen Professor of Mathematics, and in 1848 became Principal. Mr. Perkins resigned his position as Principal in 1852, on being assigned to superintend the erection of the Dudley Observatory. From 1858 to 1862 he was Deputy State Engineer of New York, and in the latter year (1862) was elected a Regent of the University of the State of New York.

**PHELPS, CHAUNCEY L.**, born Feb. 13, 1820, at Remsen, Oneida Co., N. Y.; died April 2, 1903.

Mr. Phelps was on the original surveys for the following reservoirs: North lake, South lake, Woodhull, Twin lake and Forestport, and was also engaged on the original survey for the Black River canal feeder. He held the positions of Assistant Engineer in the years 1869, 1870, 1871, 1875, 1879, 1880 and 1882, and was Resident Engineer in 1881,—all on the eastern division. Mr. Phelps was also with the Michigan Land and Iron Company at Marquette, Mich., and a land surveyor in the Black river country.

**POWELL, ARCHIBALD CAMPBELL**, born July 25, 1813, at Schenectady, N. Y.; educated at Hobart College, Geneva, N. Y.; died Sept. 10, 1884, at Syracuse, N. Y.

Mr. Powell held the position of Resident Engineer on the New York State canals from 1839 to 1846. For many years he was in business in Syracuse.

**RAMSAY, HENRY**, born 1808, at Guildorland, Albany Co., N. Y.; educated at the Lancaster School and at the Albany Academy; died in 1886.

Upon finishing his education, Mr. Ramsay became a teacher in Albany. After some years spent in various duties, he became a proficient Draftsman, Map Maker and Civil Engineer, and in 1842 was appointed Chief Engineer of the Mohawk and Hudson R. R. between Albany and Schenectady, and laid out the present course of the N. Y. C. R. R. at Schenectady, to avoid the inclined plane at that terminus. Subsequently he became Assistant Engineer on the Erie canal enlargement, and in 1853 was appointed State Engineer and Surveyor, to fill the unexpired term after the resignation of William J. McAlpine. After his retirement from that office he was occupied in several important surveys of a public nature, and finally, after spending his last few years in quiet release from all public duties, he died in 1886.

**RICHMOND, DENISON**, born Sept. 11, 1839, at Lyons, N. Y.; educated at the old Lyons Academy; died Oct. 4, 1888.

Mr. Richmond was the eldest son of State Engineer Van Rensselaer Richmond. He received an appointment to the western division in 1861, and excepting a brief period in the Pennsylvania oil fields, remained with the State until his death. In 1868 he entered the middle division, where he rose from Draftsman to Resident Engineer in 1874, filling that office till he became Division Engineer in 1883,—a position he held until his death. Mr. Richmond patented several devices for hauling boats into locks, which are still in daily use on the canals.

**RICHMOND, VAN RENSSELAER**, born Jan., 1812, at Oxford, N. Y.; educated at Oxford Academy.

In 1833, at the age of twenty-one, Mr. Richmond entered the service of the State as Chairman on the Chenango canal. He served as Resident Engineer from 1837 to 1849; First Assistant Engineer in 1850, and Division Engineer of the middle division from 1852 to 1856. He prepared the plans for the enlarged canal from Jordan to the Cayuga marshes, including the aqueduct across the Seneca river, which for many years thereafter was known as the "Richmond aqueduct." After finishing these plans in 1850, he resigned to accept the position of Division Engineer of the Syracuse and Rochester (direct) railroad. He accomplished a noteworthy feat while he was with this company—the building of a bridge, nineteen hundred feet long, across these same marshes and but a short distance from

the canal aqueduct. The piers for this bridge were built upon a foundation formed by a raft of heavy logs, stretching for some eighteen or nineteen hundred feet across the marsh. This was probably the first structure of any size built in this country upon such a plan of foundation. For over fifty years the bridge has been in successful operation. Both the aqueduct and the bridge were considered engineering achievements for their day.

Mr. Richmond was elected to the office of State Engineer and Surveyor of New York State in the fall of 1857 and re-elected in 1859. He was again elected to the office in 1867 and again re-elected in 1869, thus serving as State Engineer for eight years—the longest period for any man holding that office.

ROBERTS, DE WITT C., born 1818 at Whitesboro, N. Y.; educated at Union College, Schenectady, N. Y.; died 1871.

Mr. Roberts was Assistant Engineer on the New York State canals in 1852, having served earlier with his father, Nathan S. Roberts, on the enlargement of the Erie canal.

ROBERTS, NATHAN S., born July 28, 1776, at Piles Grove, N. Y.; self educated; died Nov. 24, 1852, at Lenox, Madison Co., N. Y.

In 1816, Mr. Roberts, in company with Judge Wright of Rome, surveyed and located the section of the Erie canal from Rome to Montezuma. He served as Resident Engineer in charge of the work from Rome to Syracuse in 1818; located the Erie canal from the Seneca river to the village of Clyde in 1819; made plans for locks between Clyde and Rochester from 1819 to 1822; located and constructed the canal down the Clyde river and through the Cayuga marshes; and was in charge of constructing the locks at Lockport and the canal from Lockport to Lake Erie from 1822 to 1825. He also made a survey of a route for a ship canal around the falls of Niagara.

Mr. Roberts was appointed Chief Engineer of the canal from Pittsburg to Kasiminetas in Pennsylvania and of the Pennsylvania canal. In 1828 he received an appointment from the Chesapeake and Ohio Canal Company as a member of the Board of Engineers. Later he built the bridge across the Potomac at Harpers Ferry. He was in the employ of the Federal Government from 1830 to 1832 as Chief Engineer in charge of an examination of the Muscle Shoals of the Tennessee river in Alabama, with the view of opening a ship canal around the shoals. From 1835 to 1841 he was associated with John B. Jervis and Holmes Hutchinson on the enlargement of the Erie canal, ranking as Chief Engineer.

ROGERS, ALBERT BRAINERD, born May 28, 1829, at Orleans, Mass.; graduated from Yale Scientific School in 1853; died May 4, 1889, at Waterville, Minn. Member of American Society of Civil Engineers.

The year following his graduation, Mr. Rogers was instructor in engineering in the Yale Scientific School. He was appointed Assistant Engineer in 1855 and Second Assistant from 1856 to 1857 on the eastern division of the New York State canals. In 1861 he took charge of the construction of the Iowa and Minnesota division of the Chicago, Milwaukee and St. Paul R. R., building from Calmar to Algona, Iowa, and from Mason City to Austin. He was also on the Hastings and Dakota road. From 1863 to 1872 Mr. Rogers was Resident and Assistant Engineer on the various lines now owned by the Chicago, Milwaukee and St. Paul Railway Company. As Chief Engineer he had charge of the building of the Minneapolis and St. Louis R. R. to Albert Lea. From 1878 to 1880 he was Chief Engineer of the Hastings and Dakota R. R. In 1881 he began explorations for the Rocky Mountain division of the Canadian Pacific R. R., of which division he had charge until its completion in 1885, when he again engaged in exploration in Montana and Wyoming.

SCHENCK, MARTIN, born Jan. 24, 1848, at Palatine Bridge, N. Y.; educated at Union College, Schenectady, graduating with the degree of C. E. Member of Municipal Engineering Association of New York City.

Mr. Schenck began his engineering career in 1869 with the Missouri, Kansas and Texas Railway in Kansas and the Indian Territory, as Rodman and Leveler. From 1871 to 1872 he was engaged in general engineering; in 1873 was Leveler on the N. Y. C. & H. R. R. R.; from 1874 to 1881 was engaged in general engineering and contracting; in 1882 was Engineer for one of the contractors on the West Shore R. R.; from 1883 to 1885 he was Inspector and Leveler in the



New York State canal department; from 1886 to 1891 Assistant Engineer in charge of the Hudson river improvement and of canal lock lengthening. Mr. Schenck was State Engineer and Surveyor of the State of New York from 1892 to 1894, and after his term of office, he became Consulting Engineer to the State Board of Health. From 1895 to 1899 he filled the position of City Engineer of Troy, N. Y. On his retirement from the position of City Engineer of Troy to the present time, Mr. Schenck has been Chief Engineer of the Department of Parks of New York City.

SEARLES, WILLIAM HENRY, born June 4, 1837, at Cincinnati O.; graduated in 1860 from the Rensselaer Polytechnic Institute at Troy, N. Y., with the degree of C. E. Member of the American Society of Civil Engineers and of the Engineers Club of Cleveland.

In 1860, after graduation, Mr. Searles became Assistant Engineer on the location of the Marietta and Cincinnati R. R., resigning in 1861 to become Assistant Engineer in the Military Service Department of Ohio. From 1862 to 1864 he was Professor of Geodesy and Railroad Engineering at the Rensselaer Polytechnic Institute, from which position he retired to accept a position as Assistant Engineer on the Pittsburgh, Fort Wayne & Chicago R. R. and the Allegheny river bridge, etc.; from 1865 to 1866, and from 1866 to 1867 as principal Assistant Engineer of location and construction on the Allegheny Valley R. R. Mr. Searles was Chief Engineer of the Ind., N. & S. Ry. from 1870 to 1871. Leaving the employ of this road he was appointed Chief Engineer, Corps No. 7, on the location of the New York, West Shore and Chicago R. R., serving in 1872 and 1873. Later he became a Consulting Engineer, with an office in New York. In 1876 he was appointed Division Engineer on the western division of the Erie canal, having charge of re-survey, new bridges and repairs to Bird island pier. Retiring from State work after 1878, he became Consulting Engineer to American Pier and Column Co. of New York from 1879 to 1880. From 1880 to 1882 he was Division Engineer of West Shore R. R., on construction of the West Point tunnel and the line from Haverstraw to Poughkeepsie. From 1883 to 1884 he was Chief Engineer of the Williamsport & Clearfield R. R., and also of the Beech Creek R. R.; from 1885 to 1891, Consulting Engineer at Cleveland, O.; and from 1891 to 1892, General Manager of the Essex Iron Co. Mines, Port Henry, N. Y. Mr. Searles is the author of "Field Engineering" and "Railroad Spiral."

SEYMOUR, HORATIO, JR., born Jan. 8, 1844, at Utica, N. Y.; graduate of Sheffield Scientific School, of Yale University, Class 1867, the degree of M. A. being conferred some years later. Member of the American Society of Civil Engineers.

Mr. Seymour began engineering work with the City Surveyor of Utica, N. Y., and was on the survey of the Canastota and Cazenovia R. R. in Madison county, N. Y. In 1871 he was appointed Assistant Engineer of the Seneca Falls and Sodus Bay R. R., and afterwards held the position of Assistant Engineer on the Wellsboro and Lawrenceville R. R., and Chief Engineer of the Cowanesque Valley R. R. In 1873 he made a survey of the Antrim mine of the Fall Brook Coal Co., and in 1874 a topographic survey of the lands of the Buffalo Coal Co., in Pennsylvania.

Mr. Seymour was appointed Assistant Engineer on the New York State canals December 1, 1874, and was elected to the office of State Engineer and Surveyor of New York State in the fall of 1877, and reelected in 1879. In 1882 he went West to take charge of lands of the Michigan Land and Iron Company in Michigan. Mr. Seymour is at present a general practising engineer at Utica, N. Y.

(Since the preparation of this sketch Mr. Seymour has died—Feb. 21, 1907.)

SEYMOUR, NORMAN, born . . . . ., at Stillwater, Saratoga Co., N. Y.; died in 1860, at Stillwater, N. Y.

Mr. Seymour was engaged for several years in laying out the Erie railroad along the Delaware river from Port Jervis to Deposit, under the direction of Hezekiah C. Seymour and Gen. Silas Seymour. On account of ill health he was compelled to retire and engage in farming and land surveying in his native town. He was expert authority on the location of the lines of the Saratoga, Kayaderosseras and Apple patents, and testified in important actions where such lines were in question. Mr. Seymour was First Assistant Engineer on the eastern division of the New York State canals in 1857 and 1858 and later was Superintendent of the Champlain canal.

## BIOGRAPHIES OF ENGINEERS—NEW YORK CANALS. 1165

SEYMOUR, SILAS, born June 20, 1817, at Stillwater, Saratoga County, N. Y.; educated at the Fredonia Academy.

In the spring of 1835 Mr. Seymour obtained a situation as Axman on one of the engineering parties engaged in making the first surveys for the New York and Erie R. R.; soon after he was promoted Rodman in another party and in the latter part of the year was appointed Assistant Engineer in charge of a part of the work; in 1838 he was made Division Engineer. He organized and became Chief Engineer of the Dunkirk and State Line R. R. About 1851 he became Chief Engineer and was for some time General Superintendent of the Buffalo and New York City R. R., extending from Hornellsville to Buffalo, and he designed and constructed the bridge across the Genesee river at Portage. Subsequently he became connected with the construction and equipment of some of the most important railroads in the country.

Mr. Seymour was elected State Engineer and Surveyor of the State of New York in 1855 and again in 1881, serving through the years of 1856, 1857, 1882 and 1883. In 1858 he established himself as Consulting Engineer in New York City. He was appointed Chief Engineer of the Washington and Alexandria R. R. and constructed a bridge across the Potomac. In 1863 he was appointed Consulting Engineer of the Washington aqueduct and afterward Chief Engineer, and in the winter of 1863-4 was Consulting Engineer of the Union Pacific R. R. The High Bridge over Dale Creek Canon, near the summit of the Black Hill range of the Rocky Mountains, was designed by Mr. Seymour. He was also connected as Consulting Engineer with several important railroads.

SMALLEY, EDWARD DELAVAN, born Aug. 24, 1842, in Saratoga Co., N. Y.; educated at the Troy High School.

In 1861 Mr. Smalley obtained a position on the Albany and Susquehanna R. R., then in process of construction, and continued on this work and other railroads for six years. In 1867 he accepted the position of Division Engineer on the Ionia and Lansing R. R. in Michigan. On the completion of this road he was engaged in locating the Marshall and Coldwater R. R., and in constructing the Detroit and Bay City R. R. The following year, 1872, he was appointed Chief Engineer of the Grand Rapids, Greenville and Alpine road. When work was suspended on that road, he removed to Utica, N. Y., and was engaged as an Engineering Expert in several important suits. In 1875 he was called to verify certain measurements and estimates of Horatio Seymour, Jr., the engineer in charge of the canals at Utica. In 1877, having formed a partnership with G. Edward Cooper, architect, the firm of Cooper and Smalley designed and erected several large public buildings in central New York. Mr. Smalley was appointed Deputy State Engineer and Surveyor by Horatio Seymour, Jr., in 1878, serving through the four years of Mr. Seymour's administration, and in 1882 he was retained in office by Silas Seymour, and served two years with him. Since leaving the State's employ, Mr. Smalley has been engaged on waterworks, sewers, and private work, and is at present located at Matteawan, N. Y.

SMITH, DE WITT C., born 1852, at St. Johnsville, N. Y.; graduated from Union College in 1875, with the degree of C. E.; died Oct. 6, 1901.

Mr. Smith was engaged in private practice until 1880, when he became engineer on the construction of the West Shore R. R., remaining until 1882 when he returned to private practice, which in 1890 he gave up in order to design and construct a system of sewers for Fort Plain, N. Y. From 1892 to 1893 he was Engineer for the General Electric Company of Schenectady, N. Y., and in 1893 was appointed City Engineer of Schenectady. In 1894 Mr. Smith became Resident Engineer on the eastern division of the New York State canals and was promoted to Division Engineer in the same year, which position he held till 1899. He was a member of the Board of Water Commissioners of the City of Schenectady from 1896 to 1901.

SOULE, HOWARD, born Dec. 8, 1829, at Sennett, Cayuga Co., N. Y.; received a common school and academic education at Auburn, N. Y. Member of the American Society of Civil Engineers since 1866.

Mr. Soule was engaged on preliminary surveys of railways from Auburn to Ithaca and Lake Ontario, and on the surveys for draining the Cayuga marshes, from 1847 to 1853, and was Second Assistant Engineer on the New York State canals from 1854 to 1856. From 1856 to 1858 he was in charge of railway construction

from Auburn to Lake Ontario; from 1858 to 1861 in charge of the work of draining the Cayuga marshes; in 1862 and 1863 he made a survey for gunboat locks on the middle division of the Erie canal, serving from 1863 to 1866 as Assistant Engineer on the canals. Mr. Soule also served as Resident Engineer of the middle division from 1866 to 1872, and as Division Engineer from 1872 to 1874. In 1874 he was appointed City Engineer of Syracuse, N. Y., serving two years, and afterwards, for twelve years, he was a contractor in designing and constructing iron bridges, in constructing about seventy miles of the West Shore R. R., in raising the locks and banks of the Welland canal in Canada, and in lengthening locks on the Erie canal. He was Consulting and Designing Engineer on the construction of the Syracuse waterworks from 1890 to 1894, and from 1894 to 1902 he was in private practice as a Consulting Engineer. Mr. Soule retired from practice in 1902.

SPRAGUE, JOSEPH WHITE, born Jan. 18, 1831, at Salem, Mass.; prepared for college at the Latin Grammar School of Salem under Oliver Carlton; graduated from Harvard in 1852 with the degree of A. B., supplemented in 1855 by the degree of A. M.; died May 22, 1900, at Vallombrosa, Italy.

Before graduating Mr. Sprague was for a short time engaged in making solar calculations for the United States Nautical Almanac and for one year was Instructor in the highest mathematics in the engineering department. From 1854 to 1862 he acted as Engineer on the enlargement of the Erie canal with the exception of the time required to make the preliminary survey for the Chesapeake and Albemarle canal, through a portion of the Dismal Swamp of Virginia. Mr. Sprague served as Second Assistant Engineer on the New York canals from 1868 to 1862. In 1858, representing the Board of Trade of St. Louis, he investigated the obstructions of navigation of the Mississippi river caused by the pier of the railroad bridge at Rock Island. Retiring from the employ of the State in 1862 he became Civil Engineer on the Ohio and Mississippi R. R., with which he remained until elected, in 1866, President of the Ohio Falls Car and Locomotive Company of Jeffersonville, Ind., which position he left in 1888 and the remainder of his life was spent in traveling in Europe and Asia.

SWEET, CHARLES ADELBERT, born Dec. 10, 1838, at Hinmansville, Oswego Co., N. Y.; educated at Fallay Seminary, Fulton, N. Y. Member American Society of Civil Engineers.

Mr. Sweet was employed on a preliminary survey of the Marquette and Ontonagon R. R. in 1858. In 1860 he entered the service of the State of New York and worked on the enlargement of the Cayuga and Seneca canal. In 1863 he was Assistant Engineer on the gunboat lock survey of the New York State canals, and in 1864 he was appointed Assistant to Chief Engineer McDougall on the survey for an interoceanic ship canal from San Blas and Bayano river, Isthmus of Panama. Returning from the Isthmus in June of the same year, he reentered the service of the State on the Chenango canal extension. In 1865 he accepted the post of Division Engineer in the location and construction of the Imperial Mexican R. R. from Vera Cruz to the City of Mexico. At the collapse of the government of Emperor Maximilian Mr. Sweet returned to this country, and in 1867 was appointed Assistant Engineer on the middle division of the New York State canals, remaining till 1871. Later, in 1871, he became Assistant Chief Engineer of the Callao, Lima & Oroya R. R. over the Peruvian Andes. In 1874 he again entered the service of the State as Division Engineer of the middle division, retiring in 1878 to accept the position of Consulting Engineer to the Emperor of Brazil. In 1881 he became Chief Engineer of the Mexican Central Railway; in 1884 Chief Engineer of the Beach Creek and Coal Mountain Company; in 1886 Assistant Engineer of the Kansas City and Sabine Pass R. R., and in 1889 of the Victoria and Temuco R. R. for the Chilean Government. After being engaged a year on this work, which failed for want of capital, he was appointed Chief Engineer to build a railroad for the Chilean Government, but owing to the revolution under President Balmaceda this effort also failed, and Mr. Sweet returned to the United States and accepted a position as Assistant City Engineer of the City of Syracuse, later being appointed City Engineer. On account of poor health, he has now retired from active practice.

SWEET, ELNATHAN, born Nov. 20, 1837, at Cheshire, Berkshire Co., Mass.; graduated from Union College, Schenectady, in 1859, with the degree of C. E.; died Jan. 26, 1903, at Albany, N. Y. Member of the American Society of Civil Engineers.

Mr. Sweet's first work in engineering was performed as Deputy Surveyor under Ward B. Burnett, Surveyor-General of Nebraska. He soon returned to his home in New York State and was employed as Assistant Engineer in various railway enterprises in the vicinity of Stephentown, Rensselaer Co. During 1864-68 Mr. Sweet was at Franklin, Pa., engaged in the engineering development of oil wells, coal mines, etc. Removing to Chicago in 1869, he was appointed Chief Engineer of the Rock Island and Quincy R. R., now a part of the Chicago, Burlington and Quincy system. In 1871 he was made Superintendent, as well as Chief Engineer; and at this same time he was Consulting Engineer for the Rockford Central and the Cairo and St. Louis railways. From 1872 to 1875 he was engaged with James R. Young in railway construction.

In 1875 Mr. Sweet was appointed by Gov. Tilden, of New York, as Expert Engineer to the Commission to investigate alleged canal frauds. He was appointed Division Engineer on the eastern division of the New York State canals in 1876; resigning in 1880, he was again engaged in railway construction with his former partner, James R. Young. In the fall of 1883 he was elected to the office of State Engineer and Surveyor of New York and reelected in 1885. Upon retiring from office after 1887, he practiced as a Consulting Engineer, and was soon made President of the Canton Bridge Co., and at one time was Receiver of the Lebanon Springs R. R. Co. In 1900 he again served the State, being President of the Advisory Commission of Engineers, appointed by State Engineer Bond to advise in the conduct of surveys for a thousand-ton barge canal. Mr. Sweet's last and most important public service was as a member of the New York Water Storage Commission.

SWEET, SYLVANUS HOWE, born Aug. 8, 1830, at Hinmansville, Oswego county, N. Y.; graduated from Falley Seminary, Fulton, N. Y., 1850; died Nov. 17, 1899.

Soon after his graduation, Mr. Sweet was appointed assistant under Col. Orville W. Childs on a survey for an interoceanic ship canal through Nicaragua. Returning, he accepted a position upon the New York State canals and in 1853 was appointed Second Assistant Engineer. From 1854 to 1859 he was First Assistant Engineer and in 1861 was Principal Assistant Engineer on the New York Harbor Encroachment Survey. Mr. Sweet was appointed Deputy State Engineer under Wm. B. Taylor in 1862 and again under Van Rensselaer Richmond in 1868, serving from 1862 to 1864 and from 1868 to 1871. In 1873 he was elected State Engineer and Surveyor of New York State, holding office during 1874 and 1875. He was also Chief Engineer for the State on the Hudson River improvement, Engineer of the Commission for the construction of the Capitol at Albany, Chief Engineer of the Albany waterworks, of the projected Maryland and Delaware ship canal, and of the Commission for the construction of the Broadway Arcade Railway. He was Consulting Engineer on many other important enterprises. Mr. Sweet was the author of the *Documentary History of the Canals*.

TAINTOR, WILLIAM NOYES, born May 8, 1870, at New York City; educated at the Brooklyn Polytechnic Institute and Columbia University School of Mines, graduating from the latter in 1894; died April 8, 1898, at New York.

In 1896 Mr. Taintor made preliminary surveys and estimates and prepared plans for the improvement of the first section of the Oswego canal. He was appointed Assistant Engineer in September, 1897, on the canal improvement work and assigned as Engineer in charge of contract No. 21, middle division, which was eight and one-half miles in length and in the vicinity of Oneida. He was also Engineer in charge of the construction of the Canaseraga culvert of the Erie canal in December, 1897.

TALCOTT, WILLIAM HUBBARD, born April 7, 1809, at Hebron, Conn.; studied engineering with John B. Jervis; died Dec. 8, 1868, at Jersey City. One of the founders of the American Society of Civil Engineers and was on the Board of Direction until his death.

From 1830 to 1837 Mr. Talcott was engaged on surveys for railroads, becoming Engineer and Superintendent of the Mohawk and Hudson R. R. In 1837 he entered upon canal engineering in New York State, and for four years was Constructing Engineer of the Genesee Valley canal. He was also Resident Engineer on the Erie canal enlargement at Fort Plain for four years. In 1845 Mr. Talcott accepted a position as Superintendent and Engineer of the western division of the Morris canal in New Jersey and in 1846 became Chief Engineer and Superintendent of

the whole canal, continuing as such for the rest of his life; he was elected President of the company in 1864. He was a director of the Second National Bank and of the Provident Institution for Savings of Jersey City, and for many years was President of the Patent Water and Gas Pipe Co., and was one of the founders and a director of the Thomas Iron Co. of Pennsylvania.

TAYLOR, WILLIAM BURDICK, born Feb. 27, 1824, at Manchester, N. Y.; educated at Utica, N. Y.; studied engineering in his brother's office; died Feb. 1, 1895.

Mr. Taylor was appointed Leveler on the Erie canal of New York State in 1848, was made Second Assistant Engineer in 1850, First Assistant in 1852, and two years later was appointed Resident Engineer, serving in that capacity till 1860. From 1860 to 1862 he held the position of Division Engineer on the eastern division of the canals. In the fall of 1861 Mr. Taylor was elected to the office of State Engineer and Surveyor of New York, was re-elected in 1863, and was again elected to the office in 1871, thus filling the position for six years. After 1874 he severed his connection with the State canal work. He also served two terms as City Surveyor of Utica, N. Y.

THOMAS, DAVID, born 1776, in Montgomery County, Pa.; died 1859 in Cayuga County, N. Y.

Mr. Thomas removed to the vicinity of Aurora, Cayuga County, in 1805. He began work on the State canals in 1817 and became prominent among the early engineers. He was appointed Chief Engineer of the Erie Canal west of Rochester and remained in the State service until 1830. He subsequently became principal Engineer of the Welland canal, Canada. Mr. Thomas was distinguished as a florist and pomologist, and by his writings rendered great service to scientific agriculture.

TRACY, JAMES G., born Oct. 4, 1837, at Albany, N. Y.; educated at Syracuse and at the Rensselaer Polytechnic Institute, Troy, N. Y.; died Sept. 13, 1903.

After graduating at Troy, Mr. Tracy engaged in railroad work and was associated, as Division Engineer, with railroads in Kentucky, Indiana and Minnesota. He was engaged upon the New York State canals as Second Assistant Engineer in 1861, and again upon the improvements during the years 1896, 1897 and 1898. A large part of Mr. Tracy's work was in private practice at Syracuse, N. Y.

TRUESDELL, CHARLES, born 1833, at Camillus, Onondaga Co., N. Y.; educated at the academies of Onondaga and Madison counties; died April 23, 1894, at Germantown, Pa. Member of the American Society of Civil Engineers.

At the age of eighteen Mr. Truesdell began his professional career under the late John McNair in locating a railroad from Fort Niagara to Chippewa on the Canadian frontier, and in the construction of the railroad from Lewiston to Niagara Falls. He was next associated with George Geddes in the service of New York State on surveys for the removal of the bar in the Seneca river at Jack's reef. In 1853 he was engaged upon the enlargement of the Erie canal, subsequently having charge of some important works on the canals, among them the new channel for Canandaigua river outlet, extensive dredging of Seneca river, the high embankment across the Montezuma marshes and the Seneca river aqueduct. He continued in the service of the State for many years, holding the position of Second Assistant Engineer during the period 1856-62, Assistant Engineer, 1863, 1867-8 and 1874-7, and was appointed by the Governor to superintend the development of the salt wells of Montezuma. As Assistant Engineer Mr. Truesdell was in charge, 1874-7, of the construction of the State dam at the outlet of Cazenovia lake, of the completion of the New Oneida Lake canal, and of repairs to dams on the Oswego river and Chenango canal reservoirs and feeders. Mr. Truesdell was Engineer for several corporations and railroads in this state and in other states of the Union. In 1891 he was appointed Assistant Engineer upon the extensive improvement of the harbor of Philadelphia under Major C. W. Raymond, retaining this position till his death.

TUBBS, JOSEPH NELSON, born Sept. 24, 1832, at Esperance, Schoharie Co., N. Y.; educated at the State Normal College, Albany, N. Y. Member of the American Society of Civil Engineers, of the American Water-Works Association, of the New England Water-Works Association.

For twenty-eight years Mr. Tubbs was connected with the New York State canals, either as Engineer or as General Inspector. From 1856 to 1869 he was Assistant Engineer and from 1869 to 1872 he was Resident Engineer of the

western division. For a number of years and until recently he was General Inspector for the Superintendent of Public Works. Mr. Tubbs spent eighteen years in designing and operating waterworks at Rochester, N. Y., and for five years he was Consulting Engineer and expert at Syracuse, Genesee, Albion, Dryden, Geneva and many other places in this and in other states.

VAN ALSTYNE, HENRY ARTHUR, born Oct. 9, 1869, at North Chatham, Columbia Co., N. Y.; educated at Nassau Academy, Marshall Seminary Preparatory School and Union University, being graduated in 1893, with the degree of C. E. Member of the American Society of Civil Engineers.

During 1892 and 1893 Mr. Van Alstyne was employed as Assistant City Engineer of Schenectady, N. Y., and in 1893-4 he was Engineer-in-charge of constructing a system of sewers in Fort Plain, N. Y. In 1894 he entered the State engineering department, serving as Leveler and Assistant Engineer. Leaving the State's employ in 1897, he accepted the position of Engineer and Superintendent for the Furnaceville Iron Co., at Rochester, N. Y. In 1898 he resigned this position to accept one with the Union Bridge Co., at Athens, Pa.

In 1899 Mr. Van Alstyne returned to the employ of the State, being appointed First Assistant Engineer. In the same year he was promoted to Resident Engineer and in 1901 to Division Engineer of the eastern division. He held this position till May, 1904, when, on the resignation of Hon. Edward A. Bond, Governor Odell appointed Mr. Van Alstyne State Engineer and Surveyor, to which position he was elected for a term of two years on Nov. 8, 1904.

VAN BUREN, JOHN D., JR., born August 8, 1838, in New York City; educated at private schools, at Harvard University, and at the Rensselaer Polytechnic Institute of Troy, N. Y., receiving the degree of C. E. in 1860. Member of the American Society of Civil Engineers, of the American Society of Naval Engineers, of the Naval Architects and Marine Engineers, of the New York Bar, and of the Military Order, Loyal Legion.

Mr. Van Buren was Assistant Engineer on the Croton Aqueduct, Department of New York City, from 1860 to 1861. At the outbreak of the Civil War he joined the Engineering Corps of the U. S. Navy and was on duty in the Gulf of Mexico, the Bureau of Steam Engineering, the Peninsula and James river campaign, and later at the U. S. Naval Academy for four years as Assistant Professor of Natural Philosophy and Engineering. In 1868 he resigned his commission of First Assistant Engineer (Lieutenant) and entered the service of the City of New York as Assistant Engineer in the Bureau of Sewers, and later as Assistant Engineer in the Department of Docks under Gen. Geo. B. McClellan. In 1875 he was a member of the Tilden Commission to investigate the State canals. Mr. Van Buren was elected to the office of State Engineer and Surveyor of New York State in the fall of 1875, serving in the years of 1876 and 1877. Since that time he has been engaged in private practice.

WATSON, WILLIAM STUART, born March 4, 1827, at Dumfries, Scotland.

Mr. Watson began his engineering career in 1843 on the Ohio canals, and in 1848 he entered the service of the State of New York on the Genesee Valley canal. In 1850 he became Assistant Engineer on the Erie canal enlargement, from which he resigned in 1851 to accept a position as Assistant to Chief Engineer William Wallace of the Buffalo and Lake Huron R. R. In 1852 he was Assistant to Chief Engineer Roswell G. Benedict on the Great Western Railway of Canada; in 1853, Chief Engineer of the Baltimore and Pittsburg R. R.; from 1854 to 1868, Chief Engineer on several railroads of California. Mr. Watson was Chief or Consulting Engineer of nearly all of the large mining canals of northern California. His greatest achievements have been in hydraulic mining works.

WHIPPLE, SQUIRE, born Sept. 16, 1804, in Worcester Co., Mass.; educated at the academy at Hartwick, Otsego Co., at Fairfield, Herkimer Co., N. Y., and at Union College, Schenectady, N. Y., graduating in 1830; died 1888. Honorary member of the American Society of Civil Engineers.

Mr. Whipple was Rodman and Leveler upon the Baltimore and Ohio R. R. from 1830 to 1832. From 1833 to 1836 he was engaged on the Erie canal enlargement under Chief Engineer Holmes Hutchinson. In 1836-37 he was employed upon the eastern division of the New York and Erie R. R. as Resident Engineer. While not actively engaged in engineering, he manufactured twenty or thirty leveling instru-

ments and several transits and theodolites, all of which proved correct and satisfactory in use. About 1840 Mr. Whipple designed and constructed a model of a scale for weighing boats of three or four hundred tons upon the enlarged Erie canal and subsequently built, by contract, the first enlarged weigh-lock for that work. This scale proved satisfactory and was the model for future weigh-locks.

In the same year, 1840, Mr. Whipple successfully designed and constructed over the Erie canal his first iron truss bridge, for which he obtained letters patent, and subsequently he built a large number of these iron, arch-truss bridges, of seventy to one hundred feet span, over the Erie canal. In 1852-53 Mr. Whipple built a wrought and cast iron bridge of 150 feet span upon the then Albany Northern, now the Delaware and Hudson, which was in constant use for thirty years, and is believed to have been the oldest iron railroad bridge of considerable span in this country, if not in the world. In 1872 letters patent were granted to Mr. Whipple for a lift-bridge, having a counterpoised floor suspended from an elevated stationary truss bridge, and movable vertically by means of a system of sheaves, cables and shafting, whereby the flooring could be raised to the truss chords for the passage of boats in the waterway beneath, and lowered to near the water surface for the transit of land traffic. In 1873-74 he built the first patent lift-bridge over the Erie canal at Utica, and later others were built at Rochester and Syracuse.

WHITE, CANVASS, born, Sept. 8, 1790, at Whitestown, Oneida Co., N. Y.; educated at Fairfield Academy; died in 1834.

Mr. White's first engineering work was on the Erie canal in 1816 under Judge Benjamin Wright. He continued engineering on the New York State canals until 1824. During this time, in the autumn of 1817, he went to England to examine and study the canals of that country. After his return from England, he discovered and patented hydraulic cement. His achievements in this and other engineering matters are told elsewhere in this volume. From 1824 to the latter part of the summer of 1826, he was Chief Engineer on the Union canal; was appointed Chief Engineer of the Delaware and Raritan canal in 1825 and of the Lehigh canal in 1827. About this time Mr. White was also Consulting Engineer for the Schuylkill Navigation Company and for the Delaware and Chesapeake canal. He became President of the Cohoes Company for the development of water-power at Cohoes upon its incorporation March 28, 1826.

WHITFORD, DAVID EARL, born Nov. 30, 1829, in the town of Northumberland, Saratoga Co., N. Y.; educated at the Schuylerville Academy.

Mr. Whitford enjoys the distinction of having served the State longer than any other Engineer. He was appointed to a place in the Engineering Department of the New York State canals in March, 1852, and has held positions continuously—ranking from Chainman to Division Engineer—in this Department since then to the present time, excepting the years 1878, '79, '80 and '81, and parts of 1854 and 1894. He was Second Assistant Engineer, 1856-62; Assistant, 1862-78; Division Engineer, 1882-84; Assistant, 1884-89; Resident Engineer, 1889-94; Assistant, 1895-date, all of his labors having been on the middle division. Aside from State work he was Assistant Engineer on the Southern Central Railroad—Auburn to Lake Ontario—part of 1854; Engineer for contractors on Quebec Harbor, Canada, in 1878; Assistant to City Engineer, Syracuse, N. Y., in 1879-80; Assistant Engineer on the construction of the West Shore railroad in 1881, and Inspector during a part of 1894 on the construction of the Woodland reservoir at Syracuse, N. Y.

WHITFORD, OSCAR F., born July 15, 1833, in the town of Northumberland, Saratoga Co., N. Y.; educated at the Schuylerville Academy, and at Union College, Schenectady, N. Y., graduating in 1858, having taken the classical course and a partial engineering course under Professor Gillespie; returned to college in 1861 and took a post-graduate course in chemistry, receiving the degree of A. M.; died May 21, 1902, at Saratoga Springs, N. Y. Member of the American Society of Civil Engineers.

After graduating from college in 1858, Mr. Whitford went to Mississippi, where he taught school and sold machinery until 1861. In 1862 he was a volunteer in the United States Army for four months, to escort and protect emigrants crossing the western plains and Rocky mountains. After this service he engaged in gold mining enterprises in Idaho and California. He left this work to accept the chair

of Mathematics and Civil Engineering in the Peoples College at Havana (now Montour Falls), N. Y., teaching there during the years 1864-65-66. During a period of ten years—1867 to 1876, inclusive—he was in the New York State Engineer's Department, being Assistant Engineer from 1871 to 1876, and working on the western and middle divisions. Leaving this service, he engaged in lead mining in Missouri for two years, after which he was an Engineer on the construction of the Southern Kansas Railroad for a year. The following year, 1880, he spent in testing cements and in the duties of general storekeeper for the Plattsburgh Bridge. Silver and gold mining in Colorado and Mexico occupied his attention from 1881 to 1887. During the last two years of this period, he was Superintendent of the Santa Barbara mines at Chihuahua. From 1888 to 1890 he was employed as Engineer for contractors on railroads for the Chilean Government. Returning to the United States, he was engaged as Assistant Engineer on the Michigan Central Railroad, then as General Inspector in the Bureau of Engineering of the City of Buffalo, N. Y., up to 1898. From that year up to the time of his death he was occupied with various engineering enterprises.

WILLARD, JAMES E., born June 3, 1832, at Louisville, Ky.; educated at the Louisville Academy. Member of the American Society of Civil Engineers.

Mr. Willard was in charge of constructing reservoirs on the headwaters of the Black river and in that vicinity; of locks and other structures on the Black River canal; of enlarged locks on the Erie canal at Watervliet and on the Champlain canal at Cohoes. He was also Division Engineer in charge of thirty miles of the Utica and Black River R. R. Since leaving the service of the New York State canals, Mr. Willard has been Engineer in charge of substructures of bridges over the Tennessee and South Chickamauga rivers, near Chattanooga, Tenn.; for six years he was in charge of the improvement of the Tennessee river at Mussel Shoals; and had charge for the U. S. Government of the improvement of the Mississippi river about seventy-five miles above Vicksburg. For the last twenty years he has been engaged as Contracting Engineer in the construction of bridge substructures (mostly pneumatic foundations) over the following rivers: the Missouri, Mississippi, Arkansas, Canadian, Wisconsin, Illinois, Ohio, Willamette (Portland, Ore.) and Schuylkill at Philadelphia. At present he is in charge of the construction for the U. S. Government, of the lock and dam on the Green river, Ky.

WILSON, ORRIN S., born March 10, 1852, at Barre Center, N. Y.; educated at University of Michigan, receiving the degree of C. E.; died Jan. 21, 1899, at Buffalo, N. Y. Member of the Albany Institute and an Honorary Member of scientific societies in Germany and St. Petersburg.

Mr. Wilson's first appointment was on the Lake Survey, with which he served one year, leaving in 1873 to go with one of the astronomical parties sent into the field by the Northern Boundary Commission. He remained on this work until its completion. In December, 1876, he was given charge of work on the Rio Grande river at Brownsville, Texas, and in 1877 was appointed Assistant in charge of the New York State Survey, remaining until its close, and writing the final report. Mr. Wilson was also Expert Engineer for the New York State Board of Health, doing work on the old canal near Rome, N. Y., also on the abandoned canal at Elmira and at Horseheads, N. Y. In 1877 he was placed in charge of building the State Asylum for Insane Criminals at Matteawan, N. Y., under I. G. Perry, State Architect. His last position was Assistant Engineer on the Buffalo section of the Erie canal of New York State, serving from 1896 to the time of his death.

WITBECK, CHARLES G., born Oct. 20, 1851; died Jan. 24, 1901.

Mr. Witbeck acquired his training as a civil engineer and surveyor from his father and for several years practiced in the town of Watervliet, N. Y. In 1880-2 and 1887-94 he was an Assistant Engineer on the New York State canals. He was Village Engineer of West Troy in 1880-6 and 1895-6, and he became City Engineer of Watervliet, when that city was organized, Aug. 1, 1896.

WRIGHT, BENJAMIN, born Oct. 10, 1770, at Wethersfield, Conn.; studied law in the office of his uncle; died Aug. 24, 1842.

Mr. Wright was the most prominent of the early canal engineers, being sometimes called the "Father of American Engineering." In 1789 he removed to Fort Stanwix (now Rome), N. Y., and in 1791 assisted in making the first survey for a canal in New York State,—one to join the Mohawk and Wood creek near Rome.



In 1808 he entered the employ of the Western Inland Lock Navigation Company and made a map and profile of Wood creek. He also surveyed the Mohawk river to Schenectady, a distance of about one hundred miles. He was employed in 1811 by the Canal Commissioners to make an examination of the north bank of the Mohawk from Rome to the Hudson, continuing this work in 1812 from Seneca lake to Rome, and from thence on the south side of the Mohawk to Albany. He was placed in charge of the middle section of the Erie canal in 1816, and from 1817 to 1828 was the Chief Engineer of the New York State canals.

From 1821 to 1827 Judge Wright was at times engaged as Chief or Consulting Engineer on the Farmington canal, from tidewater to the Connecticut at Northampton, Mass.; on the Blackstone canal from Providence, R. I., to Worcester, Mass.; on the Chesapeake and Delaware, Chesapeake and Ohio and Delaware and Hudson canals. Also from 1838 to 1834 he was on the St. Lawrence ship canal, and the Welland canal in 1837. In 1834 he was appointed by Governor Marcy to determine a route for the New York and Erie R. R., and in 1837 was engaged on the canal from Chicago to the Illinois river. Judge Wright made the first surveys for a road from Havana to the interior of Cuba in 1835-36, and later for a time was Chief Engineer of the Tioga and Chemung R. R. His last years were spent chiefly in Virginia.

WRIGHT, BENJAMIN HALL, born at Rome, N. Y., Oct. 19, 1801; graduated at West Point in 1822; died at Rome, May 18, 1881; son of Benjamin Wright, the first Chief Engineer of the Erie canal.

Mr. Wright was connected with the original surveys and construction of the Erie canal. After completing his military course, he was in the army for some time, subsequently being engaged in his father's profession of civil engineering. In later life he made experiments in the application of steam to canal navigation.

YATES, JOHN BARENTSE, born in 1834; educated at Union College, Schenectady, N. Y., receiving the degree of B. A.; died Oct., 1900, at Amherstberg, Canada.

From 1856 to 1858 Mr. Yates was Assistant Engineer on the New York Central R. R.; from 1858 to 1860 he was employed as Locating and Constructing Engineer on the Detroit and Milwaukee R. R. At the outbreak of the Civil war he entered the military service as Lieutenant of the First Michigan Engineers, under the command of Gen. Geo. H. Thomas of the Army of the Cumberland, and was with Gen. William T. Sherman on his march to the sea. He was mustered out as Colonel, having been promoted for gallant and meritorious services. At the close of the war, 1865, Col. Yates was appointed Superintendent of Railways of the Louisville and Nashville R. R. From 1868 to 1872 he was Gen. Passenger Agent of Railways running between New York and New Orleans and from 1872 to 1875 held the position of Resident Engineer on the four-track construction of the New York Central R. R. Col. Yates left the employ of the railroad in 1876 to accept the appointment as Division Engineer of the eastern division of the New York State canals, from which he retired in 1876. From 1876 until his death he was variously engaged as Locating, Constructing or Chief Engineer on railroads in Nova Scotia, North Carolina, Kansas, Ohio and Texas. At the time of his death he was in active service under the employ of the U. S. Government on the improvement of the St. Clair river in Michigan.

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**. PART THREE**

**BIBLIOGRAPHY OF NEW YORK CANALS**

**AND NAVIGABLE WATERWAYS**

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# BIBLIOGRAPHY OF NEW YORK CANALS AND NAVIGABLE WATERWAYS.

## CONTENTS.\*

	PAGE.
Preface.....	1179
Works analyzed.....	1181
General.	
Indexes to New York documents and laws.....	1184
Annual reports.....	1185
Material relating to history and construction of more than one canal.....	1188
Ship canals.....	1204
Erie canal.	
Early projects and projectors.....	1215
Construction and enlargements, main canal.....	1217
Salina and Montezuma side-cuts.....	1230
Junction canal (Erie and Watervliet).....	1231
Barge canal.....	1231
Champlain canal.....	1236
Oswego canal and river.....	1238
Cayuga and Seneca canal.....	1239
Black River canal.....	1241
Baldwinsville canal and Seneca river towing-path.....	1243
Oneida river improvement, <i>see</i> Oneida Lake canal and River improvement.	
Shinnecock and Peconic canal.....	1243
Chemung canal.....	1244
Crooked Lake canal.....	1245
Oneida Lake canal and River improvement.....	1246
Chenango canal and Chenango canal extension.....	1248
Genesee Valley canal.....	1251
Delaware and Hudson canal.....	1254
Junction canal—(Chemung and Chenango).....	1256
Buffalo and Black Rock harbors and basins.....	1257
Albany basin.....	1260
New York harbor.....	1262
Miscellaneous basins.....	1263
Miscellaneous harbors.....	1263
Cayuga marshes.....	1264
Lakes.	
Cayuga lake.....	1265
Seneca lake.....	1265
Miscellaneous lakes.....	1266

\* As entries are not generally repeated in this bibliography, it will be necessary for the user to consult all related headings; for instance, in finding material about the Black River canal look also under Annual reports, Material relating to history and construction of more than one canal, Management, Contracts, Claims, Finances, etc.

	PAGE.
<b>Rivers.</b>	
Allegheny river.....	1267
Black river, <i>see</i> Black River canal.	
Chemung and Susquehannah rivers.....	1267
East river.....	1267
Genesee river.....	1267
Harlem river.....	1268
Hudson river.....	1269
Mohawk river.....	1273
Neversink river.....	1274
Niagara river.....	1274
Oneida river, <i>see</i> Oneida Lake canal and River improvement.	
Oswego river, <i>see</i> Oswego canal and river.	
Seneca river.....	1274
Tonawanda creek.....	1275
Miscellaneous rivers.....	1275
<b>Management.....</b>	1277
Contracts.....	1283
Claims.....	1286
Finances.....	1288
Investigations.....	1301
Terminal charges.....	1306
Canal tolls; free canals.....	1306
Canal tolls on railroads.....	1313
Canals <i>versus</i> railroads.....	1314
Commerce and navigation.....	1318
Dams, <i>see</i> names of canals and rivers, Water-supply, Contracts and Claims; references before 1830 are not included.	
Water-supply, reservoirs, feeders, etc.....	1324
Use of surplus waters.....	1329
Canal lands.....	1333
Canal-boats.....	1334
Canal-boat taxation.....	1334
Canal scales.....	1335
Canal-locks.....	1335
<b>Means of propulsion on canals.</b>	
Steam.....	1339
Electricity.....	1342
<b>Proposed canals.</b>	
Long Island canal.....	1345
Niagara canal.....	1345
Orange and Sussex canal.....	1346
St. Lawrence and Lake Champlain canal.....	1346
Sharon canal.....	1347
Sodus canal.....	1348
Miscellaneous projects.....	1348
Travel on the canals.....	1351
Missions.....	1352
Sunday opening.....	1352

	PAGE.
Intoxicating liquors on canal lands.....	1352
Topographic surveys; precise leveling and bench marks; latitudes, etc.....	1352
Maps and plans.	
General.....	1353
Erie canal.....	1356
Champlain canal.....	1360
Oswego canal and river.....	1360
Cayuga and Seneca canal.....	1361
Black River canal.....	1361
Shinnecock and Peconic canal.....	1361
Chenango canal.....	1361
Genesee river.....	1362
Hudson river.....	1362
Seneca river.....	1363
Miscellaneous.....	1363
Plans of bridges.....	1364
Plans of locks.....	1364
Plans of canal-boats, engines, etc.....	1366



## PREFACE.

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This list aims to include, with the few exceptions given below, references to the material to 1906 in the New York state library on the canals and navigable waterways of the state of New York, including United States government documents, New York State legislative documents, except those relating to individual claims, the laws of New York before 1830, also those later authorizing the construction of new canals and the abandonment of old ones, books and parts of books, articles in periodicals, and some newspaper references, especially from 1817 to 1842. Some of the most valuable material on this subject is in newspapers, in the form of speeches delivered before the Legislature, editorials, and miscellaneous communications, many of which can not be found elsewhere, but which we have not attempted to include on account of our inability to make such a compilation at all complete.

Few histories of the state of New York, or of the counties or towns, are included, though many of them contain brief sketches on the subject. Gazetteers, encyclopedias, biographies and manuscripts, except in special cases, are also omitted.

Different editions of a work have been noted when at hand, but no attempt has been made at bibliographic completeness for editions or full titles.

Notes are given for some entries, as they are found necessary to distinguish them.

The arrangement of headings is according to the synopsis, shown in the table of contents immediately preceding the preface. The entries under each heading are generally chronologic.

All references in the New York state library are followed by the call number, by *New York state lib.*, or *New York state law lib.*, except the United States documents, the New York state legislative documents and the laws of New York, which are to be understood to be in the New York state law library. Pamphlet references are indicated by the use of only the first part of the call number; e. g. 386, instead of 386 H12, as for a book.

Volume and page references are separated by a colon; e. g. 3:145 means volume 3, page 145. The letters n. p. and n. d. are used in imprints for "no place" and "no date," respectively. Other abbreviations, not self-explanatory, are:

### *Size marks:*

T	32mo	D	12mo	Q	4to
S	16mo	O	8vo	F	fol.

### *Name abbreviations:*

A: August.	G: George.	P: Peter.
B: Benjamin.	H: Henry.	R: Richard.
C: Charles.	I: Isaac.	S: Samuel.
D: David.	J: John.	T: Thomas.
E: Edward.	L: Louis.	V: Victor.
F: Frederick.	N: Nicholas.	W: William.





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 Reprint.  
 Includes documents, legislative and executive of the United States Congress, 1789-1809.
- Bradstreet's*; a weekly journal of trade, finance and public economy, v.21-date. F.<sup>4</sup> N. Y.  
 1893-date. 330.5 fB72
- Buffalo board of trade. Statement of the trade and commerce of Buffalo for 1853-57, '61-62,  
 '64-65, '69-74, O. Buffalo 1854-75. 381 B86*  
 For statements for 1884-date see *Annual report of the Buffalo merchants' exchange*.
- Buffalo historical society. Publications*, v.1-date. illus. O. Buffalo 1879-date.  
 974.797 B86
- Buffalo merchants' exchange. Annual report, including statistics of the trade and commerce  
 of Buffalo, 1884-date. O. Buffalo 1884-date. 381 B861*  
 For earlier statistics see *Statement of the Buffalo board of trade*.
- Canal improvement state committee, New York. The thousand-ton barge improvement*;  
 presented by the executive committee of the canal improvement state committee. 168p. O.  
 N. Y. 1903. 386 C166
- Cassier's magazine; engineering illustrated*, monthly, Nov. 1892-date, v.3-date, illus. Q.  
 N. Y. 1893-date. 620.5 qP1
- The Chautauquan; a monthly magazine*, 1880-date, v.1-date. Q. Meadville, Pa. 1881-  
 date. 051 qC39

- Clinton league. Proceedings of the New York state conventions for "rescuing the canals from the ruin with which they are threatened" arranged by Henry O'Reilly and Hugh Allen. Ed. 2. 112p. O. N. Y. 1859. 040 P v.1248
- Colden, Cadwallader. History of the Five Indian nations of Canada, dependent on the province of New York. 20 + 204 + 283 p. 1 map, O. Lond. 1747. 970.3 C67
- Colden, Cadwallader David. Life of Robert Fulton comprising some account of the invention, progress and establishment of steamboats and other objects of public utility, with an appendix. 371p. illus. O. N. Y. 1817. 926.2 F951
- Memoir prepared at request of a committee of the common council of the city of New York and presented to the mayor at the celebration of the completion of the New York canals. 408p. illus. Q. N. Y. 1825. 386 qC67
- Commercial and financial chronicle, weekly, 1865–date, v.1–date. F. N. Y. 1865–date. 332 qC73
- In Jan., 1871, *Hunt's Merchant magazine* was incorporated with the *Commercial and financial chronicle*.
- Commercial union of the state of New York. Proceedings of the state convention, held at Rochester, Jan. 19, 1870, to consider measures for reforming the management and improving the trade of the New York state canals. 111p. O. N. Y. 1870. 040 P v.2124
- Congressional globe, 1833–72. 103v. Q. Wash. 1833–72. N. Y. state law lib.
- Congressional record, 1873–date. Q. Wash. 1873–date. N. Y. state law lib.
- Dearborn, Henry Alexander Scammel. Letters on the internal improvements and commerce of the West. 119p. O. Bost. 1839. 386 D34
- Deep waterways convention. Lake transportation; proceedings, Detroit, Mich. Dec. 17–18, 1891. 95p. O. Detroit, 1892. 387
- Electrical engineer; a weekly review of theoretical and applied electricity, Apr. 15, 1891–Mar. 2, 1899, v.11–27. illus. F. N. Y. 1891–99. 621.3 qO2
- None published after Mar. 2, 1899; merged in the *Electrical world*.
- Electrical world and electrical engineer, Mar. 11, 1899–date. illus. F. N. Y. 1900–date. 621.3 fN4
- Continuation of *Electrical world* and *Electrical engineer* combined.
- The engineer, weekly, 1856–date, v.1–date. illus. F.<sup>5</sup> Lond. 1856–date. 620.5 fL6
- Engineering, an illustrated weekly journal, 1866–date, v.1–date. illus. F.<sup>4</sup> Lond. 1866–date. 620.5 fM6
- Engineering magazine, monthly, Apr., 1891–date, v.1–date. illus. O. N. Y. 1891–date. 620.5 P1
- Engineering news and American railway journal, weekly, 1874–date, v.1–date. illus. F.<sup>4</sup> N. Y. 1875–date. 620.5 fN4
- Engineering record, building record and sanitary engineer, v.16–date. illus. (v.16–23, F. v.24 date, F.<sup>4</sup>) N. Y. 1887–date. 620.5 qN7
- Being v.16–date of the *Sanitary engineer*. 620.5 fN7
- Fisher's national magazine and industrial record, monthly, v.1–3. O. N. Y. 1846. 305 F53
- The forum, monthly, v.1–date. N. Y. 1886–date. 051 F77
- July, 1902–date published quarterly.
- Haines, Charles Gliddon, comp. Public documents relating to the New York canals, which are to connect the western and northern lakes with the Atlantic ocean. 52 + 484p. 1 map, O. N. Y. 1821. 386 H12
- Printed under the direction of the New York corresponding association for the promotion of internal improvements.
- Harper's new monthly magazine, v.1–date. illus. O. N. Y. 1850–date 051 H23
- Historical magazine concerning America, monthly. 23v. illus. O. Morrisania, N. Y. 1857–75. 973 H62
- Hosack, David. Memoir of De Witt Clinton, with an appendix containing documents illustrative of the principal events of his life. 530p. illus. map, Q. N. Y. 1829. 923.27 qC61
- Hulbert, Archer Butler. The great American canals. v.2, illus. maps, O. Cleveland 1904. (Historic highways of America, v.14; Great American canals, v.2) 917.3 H871
- Contents: The Mohawk and its improvement; Early promoters and their dreams; Clinton's memorial; Planning, building and opening; Local influence of the canal; The canal fund and enlargements.
- Acts of Legislature of New York of 1816 and 1817 in appendix.

International deep waterways association. Proceedings of the annual convention, Cleveland, Sept. 24-26, 1895. 464p. illus. maps, O. 386 In 8v.1

Jeans, James Stephen. Waterways and water transport in different countries, with a description of the Panama, Suez, Manchester, Nicaraguan and other canals. 507p. illus. O. Lond. 1890. 386. J34

Marine review and marine record, weekly. illus. F. Cleveland 1878-date. 387  
Not in New York state library.  
References from 1899-1904.

Mills, Robert. Treatise on inland navigation. 103p. 1 map, O. Baltimore 1820. 386 M62

Munsell, Joel. Annals of Albany. 10v. illus. maps, D. Alb. 1850-59. 974.743 M92

Scattered references.

Nation; a weekly journal devoted to politics, literature, science and art, 1865-date, v.1-date. F. N. Y. 1865-date. 071 qN21

National ship-canal convention. Proceedings of the convention held at the city of Chicago, June 2 and 3, 1863. 248p. O. Chicago 1863. 626.9

N. Y. (state)—Canal commissioners. Official reports and the acts of the Legislature respecting navigable communications between the great western and northern lakes and the Atlantic ocean. 112p. map, O. Newburgh, 1817. 626 H7a

Another edition published at New York, 1817, has 174 pages.

N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 287p. O. N. Y. 1900. 386 N4269

Also in *Ass. doc.* 1900, no. 79.

Separately published volume analyzed.

Report relative to proper policy the state should pursue in canal matters; F. V. Greene, chairman. 231p. illus. maps, O. N. Y. 1900. 386 N42

Also in *Ass. doc.* 1900, no. 79.

Separately published volume analyzed.

N. Y. (state)—Commerce commission. Report, C. A. Schieren, chairman, transmitted Jan. 25, 1900. 2v. 2209p. atlas, O. Alb. 1900. 380 N42

N. Y. (state)—Engineer and Surveyor. Annual report on the canals, transmitted 1851-date v.1-date. illus. O. Alb. 1852-date. 626 L1

N. Y. (state)—Health, Board of. Annual report, 1880-date, v.1-date. Alb. 1881-date. 614.09747 O0

N. Y. (state)—Governor. Messages, 1792-date.

*Assembly journal* copies analyzed.

Also in *Assembly documents* and in (353.9747 N42).

N. Y. (state)—Legislature. Documents relative to the colonial history of the state of New York, edited by E. B. O'Callaghan. v.1-15, O. Alb. 1856-87. 974.7 qN421

N. Y. (state)—Public works, Superintendent of. Annual report on the canals of the state, transmitted 1879-date, v.1-date. maps, O. Alb. 1879-date. 386 N425

Succeeds the *Annual report* of the canal commissioners.

1884-date include his *Report upon the trade and tonnage of the canals*.

Report for 1893 accompanied by a volume of maps.

N. Y. (state)—Senate and Assembly. Legislative documents, 1817-30. F. N. Y. state law lib. Includes legislative bills for this period.

Legislative documents, 1829-date. O. N. Y. state law lib.

Journal, 1777-1830. F. N. Y. state law lib.

N. Y. (state)—State, Secretary of. Documentary history of the state of New York, arranged by E. B. O'Callaghan. 4v. illus. maps, O. Alb. 1849-51. 974.7 N424

4v. illus. maps, Q. Alb. 1850-51. q974.7 N423

New York, Chamber of commerce of the state of. Annual report, 1858-date, v.1-date. illus. O. N. Y. 1859-date. 381 N42

New York produce exchange. Annual report, 1873-date. O. N. Y. 1873-date. 381 N423

Niles' national register, weekly, with a record of the events of the times, 1811-49, v.1-76. v.1-50 Q; v.51-76 F. Baltimore 1812-49. 305 qN59

North American review, 1815-date, v.1-date. O. 051 N81

v.1-7 and 124-27 are bi-monthly.

v.128-date are monthly.

- O'Reilly, Henry. Sketches of Rochester, with incidental notices of western New York  
416p. illus. map, D. Rochester 1838. 974.789 Or3
- Outlook, weekly, 1893-date, v.55-date. O. N. Y. 1893-date. 205 C4622
- Rafter, George W. Hydrology of the state of New York. 902p. illus. maps, O. Alb. 1905.  
(N. Y.—State Museum. Bulletin, no. 85, Economic geology, no. 12) 507 O8 v.24
- Railroad gazette, weekly, a journal of transportation, engineering and railroad news, 1895-  
date, v.27-date, illus. F<sup>6</sup>. N. Y. 1895-date. 385 fr132
- Railway and engineering review, weekly, v.37-date, illus. F.<sup>4</sup> Chicago, 1897-date.  
385 fr131,
- Review of reviews, monthly, 1890-date, v.1-date. American ed. illus. O. N. Y. 1890-date.  
052 R321
- v.16-date title reads: *American monthly review of reviews.*
- Richmond, Alonzo. Tolls and transportation; a free canal essential to the state's prosperity  
and the water route demonstrated to be superior to the railways, Aug. 10, 1877. 35p. O.  
Buffalo 1877. 386
- Ringwalt, John Luther. Development of transportation systems in the United States;  
water channels, roads, turnpikes, canals, railways. 398p. Q. Phil. 1888. 385 qR47
- Scientific American, an illustrated weekly journal, v.1-date. illus. (v.1, F.<sup>4</sup>; v.15-29 F;  
v.5-14 and 30-date F<sup>6</sup>) N. Y. 1845-date. 605 fK5
- Scientific American supplement, weekly, v.1-date. illus. F.<sup>5</sup> N. Y. 1876-date. 605 fN6
- Scribner's magazine; published monthly, v.1-date. illus. O. N. Y. 1887-date. 051 Scr3
- Seaboard; a Maritime reporter and nautical gazette, weekly. F.<sup>5</sup> N. Y.  
Not in New York state library.
- Seymour, Horatio. Collected works. 2v. O. 308 Se91  
Includes speeches, lectures, newspaper clippings, etc.
- Smithsonian institution—Regents, Board of. Annual report, v.1-date. illus. O. Wash.  
1847-date. 506 K7a
- Street railway review, monthly, v.1-date. illus. F. Chicago, 1891-date. 388 qSt81
- Tilden, Samuel Jones. Writings and speeches; ed. by John Bigelow. 2v. O. N. Y. 1885.  
308 T45
- Troup, Robert. Letter to Brockholst Livingston on the lake canal policy of the state of New  
York, with a supplement and additional documents. 38+34+47p. O. Alb. 1822. 386 T75
- Tuckerman, Bayard. Life of Gen. Philip Schuyler, 1733-1804. 277p. illus. map, O. N. Y.  
1903. 923.57 Sch83
- Turner, Orasmus. Pioneer history of the Holland purchase of western New York; including  
reminiscences of the war of 1812; the origin, progress and completion of the Erie canal, etc.  
670p. illus. O. Buffalo, 1850. 974.79 T85
- U. S.—Congress. Documents, 1774-date. N. Y. state law lib.  
Also some *Reports*.
- U. S.—Deep waterways, Board of engineers on. Report of the board of engineers on deep  
waterways between the Great Lakes and the Atlantic tide-waters, Dec. 7, 1900. 2v. illus.  
atlas, Q. Wash. 1900. (U. S.—House—56th cong. 2d sess. Doc. no. 149) 626.9 qQ0
- Report prepared at Detroit, Mich. Dec. 18-22, 1896 by the commissioners, accom-  
panied by the report on technical work and the several topical reports and drawings pertaining  
thereto. 263p. illus. maps, O. Wash. 1897. (U. S.—House—54th cong. 2d sess. Doc. no. 192)  
386 Un3
- Western society of engineers. Journal: papers, discussions, abstracts, proceedings, 1896-  
date, v.1-date. illus. O. Chicago 1896-date. 620.6 P6
- World to-day, monthly. illus. Q. Chic. 1900-date. 031 qC93

## GENERAL.

## Indexes to N. Y. documents and laws.

- Baxter, Archie E. comp. General index to the laws of the state of New York, 1777-1901.  
3v. O. (Ass. doc. 1902, no. 66) N. Y. state law lib.
- Other compilations are for 1777-1850, 1777-1865, 1866-70, 1871-75, 1876-77, 1876-85,  
1885-96 and 1897-1901.

Birdseye, Clarence F. A table chronologically arranged of the statutes of the state of New York from 1777 to 1894. 2v. and a supplement. N. Y. state law lib.

N. Y. (state)—Legislature. General index to the legislative documents of the state of New York, 1777-1888. 975p. O. Alb. 1891. N. Y. state law lib.

Other compilations are for 1777-1854, 1777-1857, 1777-1865, 1777-1871 and 1777-1877.

N. Y. (state)—Library. Digest of Governors' messages, published annually, 1902-date. N. Y. state law lib.

Bulletins of sociology section.

Silvernail, William H. Index to the session laws of the state of New York from 1775-1897. 899p. O. Alb. 1897. N. Y. state law lib.

Wyer, Malcolm Glenn and C. E. Groves, comp. Index to Governors' messages of the state of New York, 1777-1901. N. Y. state law lib.

Bulletin of sociology section of N. Y. State Library, 1906.

### Annual reports.

N. Y. (state)—Canal appraisers. Annual report. 386 N424

Sen. doc. 1850, no. 69	Sen. doc. 1862, no. 52	Sen. doc. 1874, no. 26
" 1851, no. 41	" 1863, no. 23	" 1875, no. 60
" 1852, no. 60	" 1864, no. 24	" 1876, no. 16
" 1853, no. 40	" 1865, no. 28	" 1877, no. 16
" 1854, no. 80	" 1866, no. 9	" 1878, no. 3
" 1855, no. 69	" 1867, no. 33	" 1879, no. 9
" 1856, no. 106	" 1868, no. 19	" 1880, no. 10
" 1857, no. 75	" 1869, no. 56	" 1881, no. 6
" 1858, no. 40	" 1870, no. 50 and 85	" 1882, no. 41
" 1859, no. 100	" 1871, no. 13	" 1883, no. 6
" 1860, no. 44	" 1872, no. 13	
" 1861, no. 30	" 1873, no. 15	

Abolished 1883 and work transferred to Board of claims.

Contains list of claims and awards of respective year, also tables showing number and amount of awards upon the several canals to and including 1837 and annually since that period. Facts of several leading and representative cases are also given.

N. Y. (state)—Canal board. Proceedings 1868-84. O. 386 N4264

Reports before 1868 may be found in manuscript in the Comptroller's office.

Report for Aug. 25-26, 1852, is in volume of pamphlets (040 P v.1947).

Reports for 1872 and 1880-83 also in volume of pamphlets (040 P v.2437).

N. Y. (state)—Canal commissioners. Annual report.

Ass. jour. 1818, 41: 63- 80	Ass. doc. 1838, no. 61	Ass. doc. 1858, no. 20
" 1819, 42:200- 11	" 1839, no. 86	" 1859, no. 40
" 1820, 43:450- 60	" 1840, no. 60	" 1860, no. 57
" 1821, 44:867- 77	" 1841, no. 72	" 1861, no. 57
" 1822, 45:126- 37	" 1842, no. 24	Sen. doc. 1862, no. 26
" 1823, 46:495- 509	" 1843, no. 25	" 1863, no. 7
" 1824, 47:533- 51	" 1844, no. 16	Ass. doc. 1864, no. 8
" 1825, 48:273- 83	" 1845, no. 28	" 1865, no. 10
" 1826, 49:994-1000	" 1846, no. 14	" 1866, no. 9
" 1827, 50:503- 21	" 1847, no. 20	" 1867, no. 7
" 1828, 51:244- 64	" 1848, no. 16	" 1868, no. 9
" 1829, 52:187- 97	" 1849, no. 40	" 1869, no. 4
Ass. doc. 1830, no. 47	" 1850, no. 45	" 1870, no. 4
" 1831, no. 38	" 1851, no. 26	" 1871, no. 6
" 1832, no. 42	" 1852, no. 33	" 1872, no. 29
" 1833, no. 36	" 1853, no. 23	" 1873, no. 6
" 1834, no. 55	" 1854, no. 65	" 1874, no. 6
" 1835, no. 85	" 1855, no. 32	" 1875, no. 6
" 1836, no. 65	" 1856, no. 100	" 1876, no. 6
" 1837, no. 73	" 1857, no. 145	" 1877, no. 45
		" 1878, no. 12

For reports before 1817, see heading of *General material relating to history and construction of more than one canal.*

Reports 1811-16 made by Inland navigation commissioners. Reprint of Reports 1817-21 also in *Public documents* compiled by C. G. Haines, 1821 (386 H 12). Reports 1825-30 also in volume of pamphlets (040 P v. 145). Office abolished in 1878. Succeeded by Superintendent of Public Works.

N. Y. (state)—Canal department, Auditor of. Annual financial report on canals. 386 N4261

Ass. doc. 1862, no. 3	Ass. doc. 1870, no. 5	Ass. doc. 1878, no. 4
" 1863, no. 4	" 1871, no. 4	" 1879, no. 4
" 1864, no. 5	" 1872, no. 4	" 1880, no. 4
" 1865, no. 3	" 1873, no. 4	" 1881, no. 4
" 1866, no. 4	" 1874, no. 4	" 1882, no. 4
" 1867, no. 5	" 1875, no. 4	" 1883, no. 4
" 1868, no. 4	" 1876, no. 4	
" 1869, no. 5	" 1877, no. 4	

Office of Auditor was abolished in 1883; this report was subsequently made by the Comptroller.

The corresponding report for previous years is the *Annual report of the Commissioners of the canal fund.* From 1850-61 this includes the *Annual financial report of the Auditor of the Canal Department*, which was transmitted to the commissioners.

## Annual report on canal expenditures.

		386	N4263
Ass. doc. 1849, no. 30	Ass. doc. 1861, no. 76	Ass. doc. 1873, no. 5	
" 1850, no. 75	" 1862, no. 179	" 1874, no. 8	
Sen. doc. 1861, no. 97	" 1863, no. 231	" 1875, no. 13	
Ass. doc. 1862, no. 125	" 1864, no. 6	" 1876, no. 17	
" 1863, no. 106	" 1865, no. 6	" 1877, no. 8	
" 1864, no. 146	" 1866, no. 6	" 1878, no. 25	
" 1865, no. 147	" 1867, no. 199	" 1879, no. 63	
" 1866, no. 213	" 1868, no. 7	" 1880, no. 37	
" 1867, no. 175	" 1869, no. 6	" 1881, no. 86	
" 1868, no. 145	" 1870, no. 6	" 1882, no. 33	
" 1869, no. 90	" 1871, no. 6	" 1883, no. 107	
" 1880, no. 174	" 1872, no. 5		

Previous and subsequent reports made by the Comptroller.

## Annual report on tolls, trade and tonnage of canals.

		386	N427
Sen. doc. 1849, no. 60	Ass. doc. 1860, no. 103	Ass. doc. 1872, no. 115	
Ass. doc. 1849, no. 170	" 1861, no. 93	" 1873, no. 71	
" 1850, no. 140	" 1862, no. 112	" 1874, no. 98	
" 1851, no. 56	" 1863, no. 224	" 1875, no. 92	
Sen. doc. 1852, no. 94	" 1864, no. 188	" 1876, no. 133	
Ass. doc. 1853, no. 107	" 1865, no. 90	" 1877, no. 31	
" 1854, no. 145	" 1866, no. 87	" 1878, no. 56	
" 1855, no. 95	" 1867, no. 226	" 1879, no. 72	
" 1856, no. 212	" 1868, no. 147	" 1880, no. 90	
" 1857, no. 185	" 1869, no. 102	" 1881, no. 87	
" 1858, no. 155	" 1870, no. 83	" 1882, no. 38	
" 1859, no. 94	" 1871, no. 77		

The office of Auditor was abolished in 1883.

The corresponding reports were transmitted 1832-48 by the Commissioners of the canal fund, 1883 by the Comptroller, 1884-date by the Superintendent of Public Works.

## N. Y. (state)—Canal fund, Commissioners of. Annual report.

		386	N426
Ass. jour. 1818, 41:100-1	Ass. doc. 1832, no. 5	Ass. doc. 1847, no. 60	
" 1819, 42:117-18 or Doc. 10	" 1833, no. 4	" 1848, no. 11	
" 1820, 43:34-36 or Doc. 5	" 1834, no. 4	" 1849, no. 100	
" 1821, 44:89-92 or Doc. 19	" 1835, no. 4	" 1850, no. 69	
" 1822, 45:447-51	" 1836, no. 4	" 1851, no. 27	
" 1823, 46:263-67 or Doc. 40	" 1837, no. 3	" 1852, no. 15	
" 1824, 47:435-38 or Doc. 73	" 1838, no. 5	" 1853, no. 15	
" 1825, 48:139-47	" 1839, no. 26	" 1854, no. 10	
" 1826, 49:521-37 or Doc. 261	" 1840, no. 74	" 1855, no. 5	
" 1827, 50:394-400	" 1841, no. 5	Sen. doc. 1856, no. 15	
" 1828, 51:840-52 or Doc. 208	" 1842, no. 18	" 1857, no. 10	
" 1829, 52:767-75	" 1843, no. 36	" 1858, no. 7	
Ass. doc. 1830, no. 152	" 1844, no. 40	" 1859, no. 4	
1831, no. 102	" 1845, no. 165	Ass. doc. 1860, no. 7	
	" 1846, no. 4	" 1861, no. 5	

The corresponding report for 1862-83 is the *Annual financial report* of the Auditor of the Canal Department.

## Report of the tolls, tonnage and trade of the New York canals.

		386	N426
Ass. doc. 1832, no. 38	Sen. doc. 1837, no. 52	Sen. doc. 1843, no. 100	
" 1833, no. 173	" 1838, no. 35	" 1844, no. 118	
" 1834, no. 107	" 1839, no. 27	" 1845, no. 115	
Sen. doc. 1835, no. 58	" 1840, no. 63	" 1846, no. 59	
" 1836, no. 70	" 1841, no. 65	" 1847, no. 90	
	" 1842, no. 33	" 1848, no. 50	

Succeeded by the *Annual report* of the Auditor of the Canal Department on the tolls, trade and tonnage of the canals.

## N. Y. (state)—Claims, Board of. Annual report.

		336.747	A7
Ass. doc. 1884, no. 72	Sen. doc. 1891, no. 23	Sen. doc. 1898, no. 6	
Sen. doc. 1885, no. 12	" 1892, no. 9	" 1899, no. 30	
" 1886, no. 11	" 1893, no. 11	" 1900, no. 27	
" 1887, no. 16	" 1894, no. 45	" 1901, no. 20	
" 1888, no. 11	" 1895, no. 14	" 1902, no. 13	
" 1889, no. 11	" 1896, no. 13	" 1903, no. 20	
Ass. doc. 1890, no. 25	" 1897, no. 16	" 1904, no. 16	

Name changed to Court of Claims; (Laws of 1897, chapter 36.)

## N. Y. (state)—Comptroller. Annual financial report on canals.

		386	N4262
Ass. doc. 1884, no. 4	Ass. doc. 1892, no. 4	Ass. doc. 1901, no. 45	
" 1885, no. 4	" 1893, no. 4	" 1901, no. 75	
" 1886, no. 4	" 1894, no. 4	" 1902, no. 51	
" 1887, no. 4	" 1895, no. 4	" 1903, no. 2	
" 1888, no. 4	" 1896, no. 41	" 1904, no. 5	
" 1889, no. 4	" 1897, no. 51		
" 1890, no. 4	" 1898, no. 30		
" 1891, no. 4	" 1899, no. 26		

The previous reports were transmitted by the Commissioners of the canal fund and the Auditor of the Canal Department.

Annual report on canal expenditures.			386	N4291
Ass. jour. 1819, 42:739-46		Ass. doc. 1835, no. 216		
" 1820, 43:594-99		" 1836, no. 211		
" 1821, 44:578-725		" 1837, no. 159		
" 1822, v. 45, Appendix B		" 1838, no. 6		
" 1823, v. 46, " E; or Doc. 181		" 1839, no. 16		
" 1824, v. 47, " C; or Doc. 126		" 1840, no. 131		
" 1825, v. 48, " F; or Doc. 163		" 1841, no. 51		
" 1826, v. 49, " I;		" 1842, no. 63		
" 1827, v. 50, " C; or Doc. 140		" 1843, no. 56		
" 1828, v. 51, " D; or Doc. 86		" 1844, no. 105		
" 1829, v. 52, " B; or Doc. 46		" 1845, no. 162		
Ass. doc. 1830, no. 208		" 1846, no. 90		
" 1831, no. 206		" 1847, no. 15		
" 1832, no. 9		" 1848, no. 60		
" 1833, no. 16				
" 1834, no. 75				
The report was transmitted by the Auditor of the Canal Department, 1849-83.				
Ass. doc. 1884, no. 14	Ass. doc. 1891, no. 4	Ass. doc. 1899, no. 27		
" 1885, no. 100	" 1892, no. 4	" 1900, no. 74		
" 1886, no. 76	" 1893, no. 88	" 1901, no. 74		
" 1887, no. 76	" 1894, no. 79	" 1902, no. 51		
" 1888, no. 22	" 1895, no. 58	" 1903, no. 2		
" 1889, no. 24	" 1896, no. 81	" 1904, no. 5		
" 1890, no. 43	" 1897, no. 58			

Annual report on the tolls, trade and tonnage of the canals for 1882. (Ass. doc. 1883, no. 142) 386 N4290

For other reports, see Commissioners of the canal fund, Auditor of the Canal Department and Superintendent of Public Works.

N. Y. (state)—Engineer and Surveyor. Annual report on canals.			626	L1
Ass. doc. 1851, no. 45	Ass. doc. 1869, no. 11	Ass. doc. 1887, no. 38		
" 1852, no. 27	" 1870, no. 25	" 1888, no. 25		
" 1853, no. 28	" 1871, no. 19	" 1889, no. 58		
Sen. doc. 1854, no. 60	" 1872, no. 11	" 1890, no. 62		
Ass. doc. 1855, no. 50	" 1873, no. 17	" 1891, no. 66		
" 1856, no. 180	" 1874, no. 24	" 1892, no. 75		
" 1857, no. 60	" 1875, no. 80	" 1893, no. 35		
Sen. doc. 1858, no. 16	" 1876, no. 27	" 1894, no. 21		
Ass. doc. 1859, no. 28	" 1877, no. 50	" 1895, no. 89		
" 1860, no. 28	" 1878, no. 9	" 1896, no. 62		
" 1861, no. 28	" 1879, no. 41	" 1897, no. 73		
" 1862, no. 8	" 1880, no. 88	" 1898, no. 67		
" 1863, no. 8	" 1881, no. 28	" 1899, no. 72		
" 1864, no. 179	Sen. doc. 1882, no. 54	" 1900, no. 39		
" 1865, no. 20	" 1883, no. 9	" 1901, no. 54		
" 1866, no. 38	" 1884, no. 9	" 1902, no. 31		
" 1867, no. 27	Ass. doc. 1885, no. 38	" 1903, no. 39		
" 1868, no. 23	" 1886, no. 44	" 1904, no. 65		

Includes reports of division engineers and resident engineers.

Annual report on companies navigating lakes and rivers, bridge companies, etc.			387
Ass. doc. 1858, no. 44	Ass. doc. 1870, no. 192	Ass. doc. 1882, no. 21	
" 1859, no. 183	" 1871, no. 112	" 1883, no. 75	
" 1860, no. 127	" 1872, no. 154	" 1884, no. 81	
" 1861, no. 83	" 1873, no. 37	" 1885, no. 86	
" 1862, no. 171	" 1874, no. 57	" 1886, no. 79	
" 1863, no. 228	" 1875, no. 73	" 1887, no. 94	
" 1864, no. 170	" 1876, no. 65	" 1888, no. 65	
" 1865, no. 109	" 1877, no. 83	" 1889, no. 58	
" 1866, no. 110	" 1878, no. 57	" 1890, no. 81	
" 1867, no. 99	" 1879, no. 70	" 1891, no. 76	
" 1868, no. 87	" 1880, no. 55		
" 1869, no. 120	" 1881, no. 48		

N. Y. (state)—Governor. Report on canals.

Ass. jour. 1818, 41: 9	Ass. jour. 1835, 58:14-19
" 1819, 42:11-13	" 1836, 59:15-21
" 1820, 43:11-13	" 1837, 60:16-18
" 1821, 44:11-12	" 1838, 61:20-24
" 1822, 45:10-12	" 1839, 62:11-26
" 1823, 46:13	" 1840, 62:11-26
" 1824, 47:11-12	" 1840, 63:24-42
" 1825, 48:12-18	" 1841, 64:16-34
" 1826, 49: 9-12	" 1842, 65:20-28, 1005-10
" 1827, 50:12-15	" 1844, 67: 14-17
" 1828, 51: 8-10	" 1845, 67: 14-25, 131, 9-41
" 1829, 52: 8-10	" 1846, 69: 24-30
" 1830, 53:22-25	" 1847, 70: 14-18
" 1831, 54:13-18	" 1848, 71: 14-16
" 1832, 55:11-15	" 1849, 72: 12-14, 20
" 1833, 56:15-21	" 1850, 73: 24
" 1834, 57:20-25	" 1851, 74:1198



**N. Y. (state)—Governor. Report on canals—Continued.**

Ass. jour. 1852, 75: 934-38	Ass. jour. 1866, 89: 23
" 1853, 76: or Ass. doc. 91	" 1875, 96: 24-25, 31
" 1853, 76:1090; or Sen. doc. 67	" 1876, 99: 600-3
" 1854, 77: 28-30	" 1877, 100: 15
" 1856, 79: 99	" 1881, 104: 16
" 1857, 80: 14	" 1895, 118: 25-26
" 1859, 82: 13	" 1896, 119: 25-26
" 1862, 85: 13	" 1898, 121: 19
" 1864, 87: 15	" 1901, 124:1855- 6

These references were taken from the *Index to Governors' messages* compiled by M. G. Wyer and C. E. Groves. The references before 1818 and those on specific divisions of the subject are given under the heading *Material relating to the history and construction* and other specific headings.

**N. Y. (state)—Inland navigation, Commissioners on. Reports, presented 1811, 1812, 1814, 1816 and 1817. O. Alb. 1811-17.** 626 H7

Also in *Laws of the state of New York in relation to the Erie and Champlain canals*, compiled by the Legislature, 1825.

For 1817-78 see *Annual reports of canal commissioners*, and for 1878-date *Annual reports of the Superintendent of Public Works*.

**N. Y. (state)—Senate and Assembly. Assembly bills, 1831-date; Senate bills, 1832-date.**

N. Y. state law lib.

Indexes of Assembly bills have been compiled for 1860-70, 1871-75 and 1871-77.

Journal, 1777-date.

N. Y. state law lib.

Laws of New York, 1777-date.

N. Y. state law lib.

Indexes have been compiled for 1777-1902.

**N. Y. (state)—Public Works, Superintendent of. Annual report on canals.** 386 N425

Ass. doc. 1879, no. 12	Ass. doc. 1888, no. 24	Ass. doc. 1897, no. 27
" 1880, no. 69	" 1889, no. 21	Sen. doc. 1898, no. 37
" 1881, no. 38	" 1890, no. 18	Ass. doc. 1899, no. 47
Sen. doc. 1882, no. 13	" 1891, no. 18	" 1900, no. 25
Ass. doc. 1883, no. 9	" 1892, no. 15	" 1901, no. 29
" 1884, no. 9	" 1893, no. 9	Sen. doc. 1902, no. 42
" 1885, no. 9	" 1894, no. 12	" 1903, no. 33
" 1886, no. 31	" 1895, no. 27	" 1904, no. 22
" 1887, no. 24	" 1896, no. 9	

Report of 1893 is accompanied by a volume of maps. 1884-date includes his report upon the trade and tonnage of the canals.

Succeeds the *Annual report of the canal commissioners*.

Annual report on trade and tonnage of canals.

386 N4281

Ass. doc. 1884, no. 77	Ass. doc. 1890, no. 19	Ass. doc. 1896, no. 92
" 1885, no. 60	" 1891, no. 19	" 1897, no. 83
" 1886, no. 65	" 1892, no. 16	" 1898, no. 70
" 1887, no. 24	" 1893, no. 72	" 1899, no. 68
" 1888, no. 68	" 1894, no. 67	" 1900, no. 92
" 1889, no. 110	" 1895, no. 33	" 1901, no. 81

This report from 1884 is published in his *Annual report on canals*; after 1901 it does not appear in separate form.

Report for 1832-48 was transmitted by the Commissioners of the canal fund; 1849-82 by the Auditor of the Canal Department; 1883 by the Comptroller.

**U. S.—Engineer department. Annual report, 1866-date.**

627 I2

With a consolidated analytical and topical index for 1866-1900.

### Material relating to history and construction of more than one canal.

See also *Annual reports, Names of canals, Management, Contracts, Claims, Finances*, and other related headings.

**New York legislative papers. 1778-**

Manuscript room

Unbound manuscript reports of elections, petitions of individuals, towns and corporations for legislative action on schools, colleges, railroads, canals, etc., arranged in packages in chronological order.

**N. Y. (state)—Assembly. Resolution, Nov. 6, 1784, on memorial of Christopher Colles. (see Ass. jour. 1784, p.41) 125 words.**

Also in *New York legislative papers*, (manuscript) no. 589.

Petition was received, Nov. 3, 1784, *Ass. jour.* 1784, p. 35.

Colles, Christopher. Proposals for the speedy settlement of the waste and unappropriated lands of the western frontiers of New York, and for the improvement of the inland navigation between Albany and Oswego. 14p. O. N. Y. 1785. 386.1 C68

An act for improving the navigation of the Mohawk river, Wood creek, and the Onondaga river, with a view to opening an inland navigation to Oswego and for extending the same, if practicable, to Lake Erie. (*see Ass. jour.* 1786, p.90 and 120)

Bill defeated.

Colles, Christopher. Petition, his report of the practicability of rendering the Mohawk river navigable, and the list of subscribers. (*see N. Y. leg. doc. (ms.) no. 589-91*)

Petition read and referred to committee in Assembly, Feb. 1, 1786; 30 words, *Ass. jour.* 1786, p. 25-26.

An act concerning roads and inland navigation, and for other purposes, passed Mar. 24, 1791. (*see Laws of New York, 1887, 3:258-59, 14th sess. chap. 53*)

Reference in Governor's speech, Jan. 5, 1791, 50 words, *Ass. jour.* 1791, 14:4.

References to proceedings in passing act: *Sen. jour.* 1791, 14:29, 30, 35, 64, 66, 67 and 68. *Ass. jour.* 1791, 14:63-64, 72, 74, 84-85, 87, 121-22, 123 and 127.

An act for establishing and opening lock navigation within this state, passed Mar. 30, 1792. (*see Laws of New York, 1887, 3:316-29*)

Also in *American state papers, Miscellaneous, 1:781-87* (Law library).

Reference in speech of Governor, and report; 350 words, *Ass. jour.* 1792, 15:8, 10-11.

References to proceedings before passing above act: *Ass. jour.* 1792, 15: 12, 14, 15, 50, 111, 124, 125, 126, 129, 136 and 144; *Sen. jour.* 1792, 15:7-8, 15, 21, 22, 23, 27, 35, 38, 39, 40, 41-42, 43, 55, 56, 61, 65.

An act to amend an act entitled "an act for establishing and opening lock navigation within this state," passed Dec. 22, 1792. (*see Laws of New York, 1887, 3:394-97*)

Also in *American state papers, Miscellaneous, 1:787-88* (Law library).

References to proceedings before passing above act: *Ass. jour.* 1792, 16:28, 30, 32, 55, 56, 57-58, 59, 62, 64, 66, 67, 70, and 79; *Sen. jour.* 1792, 16:4, 10, 11, 14, 17, 18, 19, 31, 32, 33, 34-35 and 36.

N. Y. (state)—Governor. Message. (*see Ass. jour.* 1792, 15:6)

Transmission of report on survey between Mohawk river and Wood creek and between the Hudson and Wood creek, with estimates for canals, with recommendation.

Western inland lock navigation company. Report of a committee appointed to explore the western waters in the state of New York, for the purpose of prosecuting the inland lock navigation, Sept. 1792. (*see N. Y. (state)—State, Secretary of. Documentary history of the state of New York. 1850-51. 3:659-70*)

Reprint. Also in 1849-51 edition, 3:1085-1103.

974.7 N423

974.7 N424

An act further to amend the law relative to lock navigation within this state, passed Mar. 9, 1793. (*see Laws of New York, 1887, 3:453-54*)

Also in *American state papers, Miscellaneous, 1:788-89* (N. Y. state law lib.).

References to proceedings before passing above act: *Ass. jour.* 1793, 16: 177, 180, 185, 186, 209, 214-15, 225, 226, 234 and 238; *Sen. jour.* 1793, 16:100, 101-2 and 103.

N. Y. (state)—Governor. Message. (*see Ass. jour.* 1794, 17:7-8)

Aid to amount of £10,000 given to western and northern inland lock navigation company.

Act for the more effectual prosecution of the improvements commenced by the inland lock navigation companies of the state, passed Mar. 31, 1795. (*see Laws of New York*).

Navigation along western route in 1795 and before. (*see Amer. state papers. Miscellaneous. 1:780-81*)

N. Y. state law lib,

Western and northern inland lock navigation company. Report of the directors and of the engineer, William Weston, 1795. 20p. D. N. Y. 1796. 386 W52

Also in *Publications of Buffalo historical society. 1880, 2:157-80* (974.797 B86); and *American state papers, Miscellaneous, 1:770-75* (N. Y. state law lib.).

Report of surveys and improvements of waterways from Schenectady to Wood creek and from the Hudson to Fort Edward.

An act for loaning money to the directors of the western inland lock navigation company in this state and for other purposes therein mentioned, passed Apr. 11, 1796. (*see Laws of New York*)

An act providing a means for procuring a sum to the Western inland lock navigation company, passed Mar. 17, 1797. (*see Laws of New York*)

An act further to amend the laws relative to lock navigation within this state, passed Apr. 5, 1798. (*see Laws of New York*)

Western inland lock navigation company. Report to Legislature, Feb. 16, 1798. (*see Amer. state papers, Miscellaneous, 1:777-80*)

N. Y. state law lib.

Also in pamphlet, 32p. D. (386).

An act to aid the establishing and opening the western lock navigation, passed Apr. 2, 1802. (*see Laws of New York*)

An act granting further time for completing the western inland lock navigation within this state, passed Mar. 21, 1806. (*see* Laws of New York)

Eddy, Thomas. Extracts of a letter to Samuel Osgood, relative to western and northern navigation companies, dated New York, Oct. 29, 1807. (*see* Amer. state papers, Miscellaneous, 1:75, 769-70) N. Y. state law lib.

U. S.—Treasury, Secretary of the. Report on the subject of public roads and canals made in pursuance of a resolution of Senate of Mar. 12, 1807. (*see* Amer. state papers, Miscellaneous, 1:724-921) N. Y. state law lib.

Also in appendix of *Treatise on internal navigation*, 115p. (626 H76); and in unbound pamphlets (386 and 626).

About ten pages on communications between the Atlantic rivers and the St. Lawrence and the Great Lakes.

An act to repeal a part of an act, passed Mar. 30, 1792, for establishing and improving lock navigation within this state, passed Apr. 11, 1808. (*see* Laws of New York)

N. Y. (state)—Joint committee. Report relative to making a survey of a route for a canal between the Hudson and Lake Erie, with resolution, Mar. 21, 1808. (*Ass. jour.* 1808, 31:296-97)

Also in *Laws in relation to the Erie and Champlain canals*, to 1825, followed by proceedings of Senate Apr. 6, act of Apr. 11, and commission to James Geddes to make the survey, p.8-12 (386 qN42).

Senate proceedings, *Sen. jour.* 1808, 91:246.

Geddes, James. Report to the surveyor-general, with appendices A, B and C and maps, on the inland navigation between Hudson's river and Lake Erie, Jan. 20, 1809. (*see* N. Y. (state)—Canals, Committee on. *comp.* Laws in relation to the Erie and Champlain canals. 1825. 1:13-38) 386 qN42

Inland navigation. (*see* Amer. med. and phil. reg. 1810, 1:110-11) 610.5 H4

Porter, P. B. Speech on internal improvements, delivered in the House of representatives, Feb. 8, 1810, with comment. (*see* Hosack, David. *Memoir of DeWitt Clinton.* 1829. Appendix. p.357-74) 923.27 qC61

Influential in exciting the interest of the New York Legislature in the subject.

Observations on navigable canals. (*see* Amer. med. and phil. reg. 1810, 1:145-59 and 386-89) 4000 and 400 words. 610.5 H4

Signed "An observer."

Former reference published separately, 15p. map, O. (386).

Observations on the means of preserving the commerce of New York. (*see* Amer. med. and phil. reg. 1810, 1:374-85) 3300 words. 610.5 H4

Signed "Mercator."

N. Y. (state)—Legislature. Resolution appointing commissioners, Mar. 13, 1810. (*see* Haines, C: G. *comp.* Public documents. 1821, pref. p49-51) 386 H12

Also in *Laws relating to the Erie and Champlain canals to 1825*, p.46-47 (386 qN42); and *Amer. med. and phil. reg.* 1810, 1:111-12 (610.5 H4).

An act to provide for the improvement of the internal navigation of the state, passed Apr. 8, 1811. (*see* Laws of New York)

Also in *American state papers, Miscellaneous*, 2:166 (N. Y. state lib.); and *Amer. med. and phil. reg.* 1:512-13 (610.5 H4).

N. Y. (state)—Inland navigation, Commissioners on. Report of the commissioners appointed to explore the route of an inland navigation from Hudson's river to Lake Ontario and Lake Erie, transmitted Feb. 1811. 35p. O. Alb. 1811. 626 H7

Also in *Sen. jour.* 1811, p.64-75; volumes of pamphlets (040 P1 v.1 and 040 P v.145); *Public documents* compiled by C: G. Haines, 1821, p.1-34 (386 H12); *Amer. med. and phil. reg.* 1:491-511 (610.5 H4); *Laws in relation to the Erie and Champlain canals to 1825*, 1:48-71 (386 qN42).

An act further to provide for the improvement of the internal navigation of the state, passed June 19, 1812. (*see* N. Y. (state)—Canals, Committee on. *Laws in relation to the Erie and Champlain canals.* 1825. 1:194-96) 386 qN42

Also in *Amer. med. and phil. reg.* 3:123-26 (610.5 H4); and in *Laws of New York*.

Bill introduced in Congress, with President's message, Dec. 23, 1811. (*see* N. Y. (state)—Inland navigation, Commissioners on. Report, 1812, p.32-38) 626 H7

Also in *Public documents* compiled by C: G. Haines, in 1821, p.64-70 (386 H12); *Amer. med. and phil. reg.* 1812, 3:117-23 (610.5 H4); *Laws relating to the Erie and Champlain canals to 1825*, 1:95-100 (386 qN42).

Bowne, Robert. Letter, Feb. 13, 1812, to the committee appointed to confer with the West-ern inland lock navigation company. (see N. Y. (state)—Inland navigation, Commissioners on. Report. 1812. p.39-40) 626 H7 v.1

Also in *Amer. med. and phil. reg.* 1813, 3:378-79 (610.5 H4); *Public documents* compiled by C. G. Haines in 1821, p.70-71 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:100-1 (386 qN42).

N. Y. (state)—Inland navigation, Commissioners on. Application made to Congress of United States. (see *their* Report. 1812. p.23-24) 626 H7 v.1

Also in *Amer. med. and phil. reg.* 1812, 2:449-50 (610.5 H4); *Public documents*, compiled by C. G. Haines, in 1821, p.56-57 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:88-89 (386 qN42); *Amer. state papers, Miscellaneous*, 2:165-66 (Law li-brary).

Application made to the different states and territories, Mar. 1812. (see *their* Report. 1812. p.25-26) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p.57-58 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:89-90. (386 qN42); *Amer. med. and phil. reg.* 1812, 3:114-116 (610.5 H4).

Letter to the President of the United States. (see *their* Report. 1812. p.27)

626 H7 v.1

Also in *Amer. med. and phil. reg.* 1812, 3:116-17 (610.5 H4); *Public documents* compiled by C. G. Haines, in 1821, p.59 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:90-91 (386 qN42).

Report of the commissioners appointed to attend at the seat of the general govern-ment. (see *their* Report. 1812. p.28-31) 626 H7 v.1

Also in *Amer. med. and phil. reg.* 1812, 2:451-56 (610.5 H4); *Public documents* compiled by C. G. Haines in 1821, p.59-64 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:91-94 (386 qN42).

Report of commissioners appointed by an act passed Apr. 8, 1811. 40p. O. Alb. 1812. 626 H7 v.1

Also in *Amer. med. and phil. reg.* 1813, 3:359-78 (610.5 H4); *Public documents* compiled by C. G. Haines in 1821, p.35-71 (386 H12); volume of pamphlets (040 P1 v.3); *Laws in relation to the Erie and Champlain canals* to 1825, 1:71-101, 186-96 (386 qN42). Reprint in *Public documents* is not complete.

Benefits to the state of a canal from Lake Erie to the Hudson river. Includes a copy of the application to Congress and other documents.

U. S.—President. Message to Congress on New York canals, Dec. 23, 1811. (see N. Y. (state)—Inland navigation, Commissioners on. Report. 1812. p.32) 626 H7 v.1

Also in *Amer. med. and phil. reg.* 1812, 2:450-51 (610.5 H4); *Niles' register*, 1812, 1:305-7 (305 qN59); *Public documents* compiled by C. G. Haines in 1821, p.64 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:95 (386 qN42); *Amer. state papers, Mis-cellaneous*, 2:166 (N. Y. state law lib.).

Woodard, A. B. Report on canals made to the government of the Michigan territory on a reference of the communications from New York, dated Jan. 7, 1812. (see *Niles' register*, 1814, 6:137-41) 5000 words. 305 qN59

Considers all the canals of the United States.

N. Y. (state)—Inland navigation, Commissioners on. Report, Mar. 8, 1814. 8p. O. Alb. 1814. 626 H7 v.1

Also in *Amer. med. and phil. reg.* 1814, 4:627-32 (610.5 H4); *Niles' register*, 1814, 6:153-54 (305 qN59); *Public documents* compiled by C. G. Haines in 1821, p.71-77 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, 1:102-6 (386 qN42).

An act to provide for the improvement of the internal navigation of this state, passed Apr. 17, 1816. (Ass. jour. 39:633-36 and Sen. jour. 39:312-14)

Also in *Laws of New York, and Public documents* compiled by C. G. Haines in 1821, p.264-67 or 462-64 (386 H12).

Progress of bill with act, see *Laws in relation to the Erie and Champlain canals* to 1825, 1:151 86 (386 qN42).

Forman, Joshua. Extract of a letter to canal commissioners, dated Nov. 20, 1816, relative to cost of canal for mills near Onondaga. (see N. Y. (state)—Canal commissioners. Report, 1817) 626 H7 v.1

Also in *Public documents*, compiled by C. G. Haines in 1821, p.219-20 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:316 (386 qN42).

Forms of cessions of lands, 1816. (see N. Y. (state)—Canal commissioners. Reports, 1817)

626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p.240-42 (386 H12).

The lakes with the ocean. (see *Niles' register*, Apr. 13, 1816, 10:100-2)

305 qN59

Editorial; commissioner's report on canals, Mar. 8, 1816; report of the joint committee on the great canal, Mar. 21, 1816; and a quotation from the *Albany argus* summarizing bill for revenue for the canal.

Lynch, James. Letter to David Hosack in compliance with a request to furnish a statement of the proceedings in the Legislature of the state, of which he was a member in 1816, on the bill relating to the Erie and Champlain canals. (see Hosack, David. Memoir of DeWitt Clinton 1829. Appendix. p.461-64) 923.27 qC61

N. Y. (state)—Canal commissioners. Application to Congress for an appropriation to aid in the construction of canals, 1816. (see their Reports. 1816) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p. 192-97 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, p.292-97 (386 qN42).

Copy of a letter to William Bayard, relative to a loan of money, May 23, 1816. (see their Reports. 1817. Appendix) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p.240 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:328 (386 qN42).

Report, Mar. 1816. (see Ass. jour. 1816, 39:269-70)

Also in *Public documents* compiled by C. G. Haines in 1821, p.100-2 (386 H12); *Laws in relation to the Erie and Champlain canals* to 1825, p.116-18 (386 qN42); and *Niles' register*, 1816, 10:100-1 (305 qN59).

Memorial praying aid of government in opening a communication between the Hudson river and the lakes, Dec. 11, 1816. 13p. (U. S.—14th Cong., 2d sess. Ex. docs.)

N. Y. (state)—Governor. Message. (see Ass. jour. 1816, 30:12)

Recommends state aid for building canal between the Hudson and the western lakes and Champlain.

N. Y. (state)—Joint committee. Report on that part of the speech of the Governor, relative to canals and roads. (see Ass. jour. 1816, 39:392-94)

Also in *Laws in relation to the Erie and Champlain canals* to 1825, 1:141-49 (386 qN42); and *Niles' register*, 10:101 (305 qN59).

Followed by statements on general view of the country by James Geddes and Benjamin Wright.

Stone, William L. Sketch of the legislative history of the projects for the Erie and Champlain canals in 1816 and 1817, together with notices of the leading members of the Legislature during those years who favored the enterprise. (see Hosack, David. Memoir of DeWitt Clinton. 1829. Appendix. p.430-61) 923.27 qC61

Letter to David Hosack, Feb. 20, 1829.

An act respecting navigable communications between the great western and northern lakes and the Atlantic ocean, passed Apr. 15, 1817. 3p. (Ass. doc. 1817, Mar. 19)

Also in *Public documents* compiled by C. G. Haines in 1821, p.267-75 and 464-69 (386 H12).

Brown, Matthew, jr. and Francis Brown. Copy of letter relative to cost of a canal made at the falls on Genesee river, dated Jan. 1, 1817. (see N. Y. (state)—Canal commissioners. Report. 1817) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p.218-19 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:315-16 (386 qN42).

N. Y. (state)—Canal commissioners. Considerations addressed to members of Congress relative to plan for appropriation for internal improvements, Jan. 22, 1817. (see Haines, C. G. comp. *Public documents*, 1821. p.214-15) 386 H12

N. Y. (state)—Canals, Joint committee on. Report on the contemplated canals. 10p. (Ass. doc. Mar. 19, 1817; or, Ass. jour. 1817, 40:623-32)

Also in *Public documents* compiled by C. G. Haines in 1821, p.242-59 (386 H12); and in volume of pamphlets (040 P v.223).

Advantages of canals to New York state and plans for constructing them.

Porter, Augustus. Copy of a letter to one of the canal commissioners giving estimate of canal between Lake Erie and Genesee river, based on his own canal, dated Jan. 3, 1817. (see N. Y. (state)—Canal commissioners. Reports. 1817) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p. 216-17 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:313-15 (386 qN42).

Sullivan, John L. Copy of a letter giving comparative estimates on probable cost of contemplated canal, 1817. (see N. Y. (state)—Canal commissioners. Reports. 1817) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p. 223-33 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:320-322 (386 qN42).

Swift, Philetus. Letter relative to the cost of his canal in Phelpsstown, dated Mar. 5, 1817. (see N. Y. (state)—Canal commissioners. Reports. 1817) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p. 215-16 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:312-13 (386 qN42).

Genet, Edmund Charles. Explanations on the lateral canals. (see Alb. argus, Dec. 18, 1818) 600 words. 071 xAl

Letter to the editor.

Haines, Charles Gliddon, *anon.* Considerations on the great western canal from the Hudson to Lake Erie, with a view of its expense, advantages and progress; republished by order of the New York corresponding association for the promotion of internal improvements. 81p. O. Brooklyn, 1818. 040 P v.27 or 145

Contains an article on the northern canal, p.61-68, and a letter from William Darby, p.69-80.

N. Y. (state)—Assembly. Address in answer to the speech of the Governor, at the opening of the session. (*see* Ass. jour. 1818, 41:135-36, 139)

An act concerning the great western and northern canals, passed Apr. 7. 2p. F. (Sen. doc. 1819, no. 28; also, Ass. doc. 1819, no. 75)

Also in *Laws of New York*, and in *Public documents* compiled by C. G. Haines, p.469-71 (386 H12).

Beach, Samuel B. Considerations against continuing the great canal west of the Seneca, addressed to the members-elect of the Legislature of New York by Peter Ploughshare. 29p. O. Utica, 1819. 040 P v.145 or 223

Proposes using the Oswego river instead of continuing the canal.

N. Y. (state)—Internal improvements, Joint committee on. Report on so much of the Governor's speech as relates to the internal improvements, and on the annual report of the canal commissioners. 14p. O. Alb. 1819. 386

Also in *Public documents* compiled by C. G. Haines in 1821, p.365-72 (386 H12).

An act, passed Mar. 30, 1820, to amend "an act respecting navigable communications between the great western and northern lakes and the Atlantic ocean," passed Apr. 15, 1820. (*see* Laws of New York)

Also in Ass. doc. 1820, no. 64, and in *Public documents* compiled by C. G. Haines in 1821, p.479-81 (386 H12).

An act concerning the Erie and Champlain canals, passed Apr. 12, 1820. (*see* Laws of New York) —

Also in *Public documents* compiled by C. G. Haines, 1820, p.481-82 (386 H12), and in incomplete form in Ass. doc. 1820, no. 143.

The canal policy. (*see* Alb. daily advertiser, June 28, 1820) 1200 words. N. Y. state lib.

From *New York statesman*. Editorial.

N. Y. (state)—Canal commissioners. Report, Feb. 21, 1820, with report by D. S. Bates of a survey up the Oswego river, and by David Thomas of Buffalo harbor. 28p. (Ass. doc. 1820, no. 108; or, Ass. jour. 43:496-503) 040 P v.223

Also in *Public documents* compiled by C. G. Haines in 1821, p. 407-29 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:489-502 (386 qN42); and Report on progress in construction of canals.

An act concerning the completion of the Erie and Champlain canals, passed Feb. 9, 1821. (*see* Laws of New York)

Also in *Public documents* compiled by C. G. Haines in 1821, p.450-52 and 483-84 (386 H12).

The grand canals. (*see* Alb. daily advertiser, Oct. 11, 1821) 300 words. N. Y. state lib.

From *Albany register*.

Describes the work of construction.

Haines, Charles Gliddon, *comp.* Public documents, relating to the New York canals, which are to connect the western and northern lakes with the Atlantic ocean. 52+484p. 1 map. O. N. Y. 1821. 386 H12

Printed under the direction of the New York corresponding association for the promotion of internal improvements.

These papers consist of the seven reports of the canal commissioners from 1810-21, and a variety of legislative papers, including acts, the application to the general government for assistance and the report thereon, the report of the commissioners of the canal fund and a valuable correspondence on the subject of canals in general and their construction.

N. Y. (state)—Canals, Committee on. Report on so much of the speech of the Governor as relates to the northern and western canals. 5p. (Ass. doc. 1821, no. 131; or, Ass. jour. 1821, 44:1081-84)

N. Y. (state)—Claims, Committee of. Report on the complaint of the Western inland lock navigation company on the injustice of the award. (*see* Ass. jour. 1821, 44:1090-91)

The reviewer reviewed. (*see* Alb. gazette and daily advertiser, Feb. 26 and Mar. 3, 1821) 2300 words. N. Y. state lib.

Extracts from Robert Troup's pamphlet on the canals.

An act relative to the rate of movement of boats on the Erie or Champlain canals, the extension of the Salina side-cut, the exemption from execution of materials for construction of the canals, and for other purposes, passed Apr. 17, 1822. (*see* Laws of New York)

Adams, John. New York canals. (see Alb. daily advertiser, Dec. 23, 1822) 200 words.  
N. Y. state lib.

Letter to Elkanah Watson.

Goodenow, Sterling. The grand canals. (see his Brief topographical and statistical manual of the state of New York. 1822. Ed. 2 enl. p.18-23) 317.47 G61

Porter, D. New York canals. (see No. Amer. rev. 1822, 14:230-51) 051 N81

Review of the progress of work on the canals, the cost, and the policy of the state concerning them.

An act concerning an appropriation of \$1,300,000 for the Erie and Champlain canals, passed Mar. 29, 1823. (see Laws of New York)

Clinton, DeWitt. Progress and influence of the Erie and Champlain canals. (see his Speeches before the Legislature, 1817-23. p.39-42) 329.3 D29

Memorial of the trustees of the villages of Lansingburgh and Waterford concerning location of canals at said places. 2p. (Ass. doc. 1823, no. 143)

An act, to provide for the completion of the Erie and Champlain canals, passed Apr. 12. 1p. (Sen. doc. 1824, no. 145)

Also in *Laus of New York*.

Genet Edmond Charles Edouard. Address on the several subjects of science, useful knowledge, public improvements, finances and public law in reference to rivers, canals, navigation and commerce, delivered in Assembly room at the capitol, Albany, Feb. 5, 1824. 43p. O. Alb. 1825. 390 G28

The New York canals. (see Alb. daily advertiser, June 17, 1824) 6400 words.

N. Y. state lib.

Signed "U." Full description of the present condition and future utility of the canals.

An act relating to the Erie and Champlain canals, passed Apr. 20, 1825. (see Laws of New York)

Extension of Erie canal to Lake Erie and improvements to both.

An act to provide for the survey of certain canal routes, passed Apr. 20, 1825. (see Laws of New York)

N. Y. (state)—Canals, Joint committee on. Report on so much of the Governor's message as relates to internal improvements, together with the several reports of the commissioners of the canal fund, and various resolutions and petitions on canals, claims for damages, etc. (see Ass. jour. 1825, 48:639-47)

—— comp. Laws of the state of New York in relation to the Erie and Champlain canals, together with the annual reports of the canal commissioners, and other documents, requisite for a complete official history of those works; also correct maps delineating the routes of the Erie and Champlain canals and designating the lands through which they pass. 2v. maps, Q. Alb. 1825. q386 N42

Spafford, Horatio Gates. Pocket guide for the tourist and traveler along the line of the canals, and the interior commerce of the state of New York. Ed.2 enl. 88p. S. Troy, 1825.

917.47 Sp11

Internal improvement. (see Alb. argus and city gazette, Dec. 22, 1826) 1600 words.

071 xAll

Editorial on Chemung, Cayuga, Chenango, Conewango and Black River canals.

N. Y. (state)—Canal commissioners. Report under the act providing for the survey of certain canal routes. 29p. F. (see Ass. jour. 1826, v.49. Appendix F)

Surveys, estimates, etc., for Black River, Chenango, Genesee, Chemung, and Port Watson canals.

N. Y. (state)—Canals, Committee on. Report on canal commissioners' report. 5p. (Sen. doc. 1826, no. 265)

—— Report on petitions for canals from the Erie canal to Binghamton, and from Seneca lake to the Chemung river. (see Ass. jour. 1826, 49:1031-34)

N. Y. (state)—State, Secretary of. Report relative to the republishing of the laws and other official documents relating to the Erie and Champlain canals and the disposition of the work. (see Sen. jour. 1826, 49:165-66)

Revised statutes, passed Sept. 11, 1827, chap. 9, title 9. (see Laws of New York, 1827, 50:91-126)

- Contents:* Art. 1. Designation and description of the canals.  
 Art. 2. Of the canal commissioners, and their general powers and duties.  
 Art. 3. Of the appraisement of damages.  
 Art. 4. Of the canal board, their powers and duties.  
 Art. 5. Of water privileges, and the sale of surplus waters.  
 Art. 6. Of the superintendents of repairs, and the collection of tolls.  
 Art. 8. Regulations and penalties concerning the protection and maintenance of the canals.  
 Art. 9. Miscellaneous provisions of a general nature.

N. Y. (state)—Canals, Committee on. Report on so much of the Governor's message as relates to the practicability of keeping the canals in a navigable state. (see Sen. jour. 1828, 1st sess. 51:137-39; or, Sen. doc. 1828, no. 73)

On the inland navigation of the U. S. of America. (see Quar. jour. of scientific literature and art, 1828, 25:2-5, 10-16; 26:29-37) 505 H7

N. Y. (state)—Legislature. Concurrent resolutions for survey of specified canal routes, passed Mar. 24, Apr. 7, Apr. 29 and May 4, 1829. (see Laws of New York)

Armroyd, George, anon. Connected view of the whole internal navigation of the United States. 1830. p.52-92. 386 Ar51

*Contents:* New York Champlain canal, p.52; Erie and Hudson canal, p.53-65; St. Lawrence and Champlain canal, p.65; Oswego canal, p.66; Great Sodus Bay canal, p.67; Cayuga and Seneca canal, p.68; Delaware and Hudson canal, p.69; Lackawaxen and Cookquago canal, p.70; Cookquago and Canistota canal, p.71; Newburgh and Water gap canal, p.73; Rochester and Olean canal, Genesee and Chemung canal, p.74; Chenango canal, p.75; Seneca and Tioga canal, Cayuga and Oswego canal, p.75; Conewango canal, Portland and Maysville canal, p.77; Black River, Ontario canals, Ogdensburg and Boonville canal, p.78; The overslaugh, p.79; Long Island canals, p.80; Port Watson canal, p.81; Unadilla canal, p.81; Batavia canal, p.82; Buffalo and Olean canal, p.82; Battenkill canal, p.82; Sharon canal, p.83; Catskill canal, p.83; Niagara canal, p.83; Summary, p.84-91.

Tanner, Henry S. Memoir of the recent surveys and internal improvements in the United States, with notices of the new counties, towns, villages, canals and railroads. Ed.2. p.20-25, D. Phil. 1830. 912.73 T13

N. Y. (state)—Commissioners. Report of commissioners to whom was referred that part of the Governor's message relating to canals. 40p. (Sen. doc. 1831, no. 32)

Marshall, John. The life of George Washington. 2v. O. Phil. 1832. 923.17 W2m31  
 On inland navigation, v.2, p.65-70.

N. Y. (state)—Canal board. Report on memorials of Jacob Trumpbour and Holmes Hutchinson concerning surveys of Erie, Champlain, Oswego, and Cayuga and Seneca canals. 25p. (Ass. doc. 1832, no. 188)

N. Y. (state)—Select committee. Report on memorials of Jacob Trumpbour and Holmes Hutchinson on the survey of the canals. 71p. (Ass. doc. 1832, no. 334)

Documents accompanying the above report, 149p., Ass. doc. 1832, no. 335.

N. Y. (state)—Canals, Committee on. Report on so much of Governor's message as relates to internal improvements and on reports of canal commissioners, commissioners of canal fund, and canal board. 28p. (Ass. doc. 1833, no. 268)

Canals in the state of New York. (see Journal of the Franklin institute, July, 1834, 14:66-70)

Brief accounts of existing and contemplated canals. 605 16

N. Y. (state)—Canals, Committee on. Report on so much of the Governor's message as relates to canals and internal improvements. 11p. (Sen. doc. 1834, no. 55)

N. Y. (state)—Select committee. Report on petition of inhabitants of Oswego county, relative to improvement of navigation between lake Ontario and the Hudson. 11p. (Ass. doc. 1834, no. 380)

Poussin, G. T. Travaux d'améliorations intérieures projetés ou exécutés par le gouvernement général des Etats-Unis d'Amérique de 1824 à 1831. p.308-61, Q. Par. 1834. 386 qP86  
 Erie, p.308-53; Champlain, p.357-61.

Mitchell, Samuel Augustus. Mitchell's compendium of the internal improvements of the U. S., notices of all the most important canals and railroads, with notice of internal improvement in Canada and Nova Scotia. p.17-21, map. S. Phil. 1835. 386 M69

N. Y. (state)—Canal board. Report on petition of Holmes Hutchinson concerning his surveys, field notes, maps, etc., of the state canals and all lands connected therewith. 8p. (Ass. doc. 1835, no. 140)



Utica, Internal improvement convention. Proceedings of the convention, Nov. 11, 1835. (see Amer. R. R. jour. 1835, 4:418-19) 2100 words. 620.5 qJ2  
Announcement of convention, p.338, 400 words; editorial, p.417, 1000 words.

The western traveller's pocket directory and stranger's guide. 93p. Schenectada, 1836. 917.3 W52

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From the *Buffalo daily commercial advertiser*.

The canals. (see Alb. daily argus, Mar. 18, 1837) 5300 words. 071 xAll

Speech of M. H. Caah in the Assembly on his resolution calling for a suspension of operations under the acts authorizing the construction of the Black River and Genesee Valley canals.

— (see Alb. daily argus, Mar. 31, 1837) 2200 words. 071 xAll

Speech of Richard Hulbert in the Assembly on the bill suspending operations under the acts authorizing the construction of the Black River and Genesee Valley canals.

N. Y. (state)—Canal board. Report in relation to estimated and actual cost of finished and unfinished canals. 11p. (Ass. doc. 1837, no. 189)

The canals and the irredeemable bank party. Editorial. (see Alb. daily argus, July 7, 1838) 700 words. 071 xAll

New York and Pennsylvania canals. (see Alb. daily argus, June 25, 1838) 1200 words. 071 xAll

Concerning canal policy of New York; editorial.

O'Reilly, Henry. Origin and progress of the canal system. (see his Sketches of Rochester. 1838. p.175-242) 974.789 Or3

Canal trade of Rochester, p.332-34.

Internal improvements. (see Alb. daily argus, Mar. 4, 1839) 2500 words. 071 xAll  
Reviewing cost of construction, volume of business transacted, usefulness of lateral canals, etc.

Judge Bowman and the removal of DeWitt Clinton. Editorial. (see Alb. daily argus, Feb. 26, 1839) 800 words. 071 xAll

Dearborn, H. A. S. Letters on the internal improvements and commerce of the West. 75p. O. Bost. 1839. 040 P v.1859

N. Y. (state)—Canal commissioners. Report relative to expenses of Erie, Genesee Valley and Black River canals. 2p. (Ass. doc. 1839, no. 267)

Our system of internal improvements. (see Alb. daily argus, Mar. 19, 1839) 1600 words. 071 xAll

Urging moderation in canal construction, etc.

Repairs on the canals. (see Alb. daily argus, Jan. 23, 1839) 700 words. 071 xAll  
Editorial on Comptroller's annual report.

N. Y. (state)—Canals, Committee on. Report on so much of the Governor's message as relates to internal improvements. 28p. (Ass. doc. 1840, no. 277)

Tanner, Henry S. Description of the canals and railroads of the United States. p.50-59, maps, O. N. Y. 1840. 385 T15

Memorial of several citizens of Niagara county, praying for the incorporation of a company which shall be authorized to complete the Erie canal enlargement, and the Genesee Valley and Black River canals on certain conditions. 3p. (Ass. doc. 1842, no. 160)

N. Y. (state)—Canals, Committee on. Report in relation to the preservation of the maps, plans and models of the public works. 2p. (Ass. doc. 1842, no. 164)

— Report on the several petitions for the speedy enlargement of the Erie canal west of Lockport, and for the speedy completion of the Genesee Valley canal. 2p. (Ass. doc. 1842, no. 190)

N. Y. (state)—Governor. Message. (see Ass. jour. 1842, 65:11)

Suggests that engineers and architects should "be required to deposit in archives their plans, maps, estimates and models of canals, railroads and public edifices."

Report of the canal commissioners of the state of New York. (see Amer. R. R. jour. 1842 14:133-37) 700 words. 620.5 J2

Extracts and comments. Enlargement of Erie canal is considered premature. Favors support for Erie and New York railway.

N. Y. (state)—Canal fund, Commissioners of the. Annual report for 1842. (*see* Amer. R. R. jour. 1843, 16:166-73) 620.5 J2  
Extracts of useful information and comment.

N. Y. (state)—Canals, Committee on. Report of Mr. Murray on so much of the Governor's message as relates to the canals. 11p. (Ass. doc. 1843, no. 170)  
Minority report, 28p. Ass. doc. 1843, no. 168.

N. Y. (state)—Surveyor-General. Report on maps, plans, etc., furnished by companies to which state credit was loaned. 8p. (Ass. doc. 1843, no. 41)

N. Y. (state)—Canals, Committee on. Report of Robert Denniston on part of Governor's message, on bill, entitled "an act to provide for the preservation and protection of the works on the unfinished canals of the state," and two petitions from Allegheny county for "a resumption of the suspended public works." 61p. (Sen. doc. 1844, no. 98)

——— Report on so much of the Governor's message as relates to canals. 71p. (Ass. doc. 1844, no. 177)

Favors completion of canals by means of canal revenues.

N. Y. (state)—Governor. Message. (*see* Ass. jour. 1844, 67:14-16; 1845, 68:1319-41)  
Against renewal of work on canals and railroads except where new structures are so nearly finished that completion would cost less than repair of old structures.

Sentiments expressed by the committee on canals to the Senate of New York, Apr. 10, 1844. 4p. O. 040 P v.1859

Internal improvements. (*see* Fisher's national mag. 1845, 1:183-88, 284-88, 363-73)

Historical sketch, tables of trade and tonnage, and tables showing official valuation of property in the city and state of New York, 1815-35. 305 F53

N. Y. (state)—Canals, Committee on. Report on so much of the Governor's message as relates to canals. 15p. (Ass. doc. 1845, no. 235)

Brief description of unfinished portions of canals and estimated expense of completing them.

N. Y. (state)—Governor. Message. (*see* Ass. jour. 1845, 68:12-21)

In view of the enormous debt, it is not considered wise to build more canals.

Renwick, James. Life of DeWitt Clinton. 334p. illus. O. N. Y. 1845. 923.27 C6111  
Chapters 10-19, p.129-265, on early history of canals and waterways.

State works of New York. (*see* Amer. R. R. jour. 1845, 18:170-71) 620.5 qJ2  
Extracts from report of the canal commissioners.

Clark, Lot. Internal improvements in the state of New York. (*see* Fisher's national mag. 1846, 3:321-40) 10,000 words. 305 F53

Also in volume of pamphlets (040 P v.477).

Speech in the committee of the whole on the Governor's message, 1842, on the present condition of canals, need of completing Genesee Valley and Black River canals (p.325) and of enlargement of Erie canal.

N. Y. (state)—Ways and means, Committee on. Report. 8p. (Ass. doc. 1846, no. 187)

Unwise to enter upon enlargement of Erie canal and completion of Black River and Genesee Valley canals when canal debt already incurred is still a burden upon the state. Includes a statement of the debt.

——— Report of the minority in answer to a resolution of the Assembly directing that committee to inquire whether it be expedient to resume the prosecution of the unfinished public works. 30p. (Ass. doc. 1846, no. 212)

Public works considered are the enlargement of the Erie canal, the Black River canal and Erie canal feeder, the Genesee Valley canal and the improvement of the Oneida river.

Favors completing unfinished works on the same safe principle of finance based upon the revenues of the canals.

Statement of length and cost of the finished canals in the state and of the finished part of the Genesee Valley canal. (*see* Amer. R. R. jour. 1846, 19:745-46) 400 words. 620.5 qJ2

Answer to A. Whitney's article "A statement of the comparative cost and income of canals and railroads," p.677-79 of same volume.

Hammond, Jabez D. New York canals. (*see* his Life and times of Silas Wright. 1848. p.84-96, 116-23) 923.27 W933

History of the canal policy of the state of New York, in review of a letter written by S. B. Ruggles to some citizens of Rochester, 1849. 16p. O. 040 P v.477

From *Evening post*, extra

N. Y. (state)—Canals, Committee on. Report on reports of canal commissioners and commissioners of canal fund and on sundry petitions in relation to canal appropriations and improvements of the canals. 5p. (Ass. doc. 1849, no. 178)

- Turner, Orsamus. The Erie canal. (*see his Pioneer history of the Holland purchase.* 1849. p.617-43) 974.79 T852
- Appendix contains some sketches of pioneer villages created by the canal.
- Internal improvements in the state of New York. (*see Amer. R. R. jour.*) 26,000 words. 620.5 qJ2
- 1850, 23:643-44, 722-23, 737-38, 752-53, 769-70 and 804-5.
- 1851, 24:15-16, 18-19, 47-48, 83-84, 98-99, 114-15, 148-49, 164-65 and 227-28.
- From the *Merchant's magazine*. Historical sketch from 1816 to 1850.
- N. Y. (state)—Canal commissioners. Report relative to projected plans of enlargement of canals other than the Erie. 7p. (Sen. doc. 1850, no. 88)
- Minority report. Unnecessary to enlarge lateral canals. Work should be centered upon Erie canal.
- N. Y. (state)—Canal fund, Commissioners of. Report on proposed canal improvements. 5p. (Sen. doc. 1850, no. 97)
- N. Y. (state)—Attorney-General. Report on the bill to provide for the enlargement of the state canals. 22p. (Sen. doc. 1851, no. 68)
- Attorney-General's opinion on unconstitutionality of bill, of incurring debt in manner proposed, and of issuing certificates redeemable out of the surplus revenues of canals.
- Report on so much of the Governor's message as relates to the completion of the canals. 63p. (Ass. doc. 1851, no. 102)
- Minority report. 8p. Sen. doc. 1851, no. 70.
- N. Y. (state)—Canals, Committee on. Report on the Assembly bill to complete the enlargement of the canals of the state. 21p. (Ass. doc. 1851, no. 69) 040 P v.2438
- Includes opinion of Daniel Webster, Apr. 11, 1851.
- N. Y. (state)—Governor. Message, extra session. 11p. (Sen. doc. 1851, no. 75)
- Favors speedy completion of canals by means free from constitutional objection.
- N. Y. (state)—Legislature. Public works; reports and speeches in favor of the enlargement of the Erie canal and the completion of the Genesee Valley and Black River canals, made in the Legislature of 1851. 48p. O. Alb. 1851. 040 P v.1233 or v.1947
- Opinion of Samuel Beardsley and letter from W. L. Marcy on the canal bill. 15p. O. Alb. 1851. 040 P v.223
- Cites constitutional objections to canal bills relative to the Erie, Genesee Valley and Black River canals.
- Stanton, Henry B. Speech on the Governor's message, delivered in the Senate of New York, Jan. 11, 1851. 8p. O. Alb. 1851. 040 P v.2438
- Denio, Hiram. Argument in the case of the people *ex rel.* Phelps *vs.* J. W. Newell, Auditor of the Canal Department, on the constitutionality of the act relating to the completion of the canals, before the court of appeals, April term, 1852. 41p. O. Alb. 1852. 040 P v.1947
- Opinions of the judges of the court of appeals on the constitutionality of the canal act. 49p. O. Alb. 1852. 040 P v.1947
- Cooley, James E. Speech before the democracy of Syracuse, Nov. 1, 1853. 40p. O. N. Y. 1853. 386
- Canal policy indicated, p.3-20.
- Enlargement and completion of the canals; probable cost. (*see Amer. R. R. jour.* 1854, 27:764) 620.5 qJ2
- Brief remarks and tabular statements of a part of lettings.
- Extracts from the reports of the canal commissioners and the State Engineers and from the proceedings of the Legislature, 1811-54, relating to the state canals. 74p. O. Rochester, 1855. 040 P v.227
- History of the Erie canal. (*see Amer. R. R. jour.* 1855, 28:146-48) 4000 words. 620.5 qJ2
- Includes all New York canals, to 1854.
- N. Y. (state)—Engineer and Surveyor. Annual report upon the state canals for 1854, 27:187-89, 234-37, 251-53. (Ass. doc. 1855, no. 50) 620.5 qJ2
- Contents: 1. Progress of the public works in the state.  
2. Canals and railroads of the state as a dependent system.  
3. Extension of the channels of trade and travel beyond the state.  
4. Cost and charges of transport.  
5. Comparative cost, capacity and revenue of the Erie canal and parallel railroads.  
6. Analysis of the present business of the canals.  
7. Comparison of present business with that of former years.

- Fisher, Richard Swainson, comp. Canals of the United States. (see Amer. R. R. jour. 1856, 31:306-7, 312) 1200 words. 620.5 qJ2  
Tabular statement with editorial.
- N. Y. (state)—Canal board. Report on cost of enlargement and completion of canals. 41p. (Ass. doc. 1856, no. 146)
- Seymour, Horatio. Lecture on the topography and history of New York. 41p. O. Utica, 1856. 974.7
- Memorial to the Legislature of the state of New York upon the present state of canals. 15p. O. Alb. 1857. 040 P v.258  
The present state of the canals, the necessity of their enlargement and the effects of the passage of the western trade through the Welland and Oswego canals.
- Canals of New York. (see Amer. R. R. jour. 1859, 32:450-51) 2700 words. 620.5 qJ2  
From the report of the *Chamber of commerce of New York*.  
New York canals contrasted with those of other countries.
- Clinton league. Proceedings of the New York state conventions for "rescuing the canals from the ruin with which they are threatened," arranged by Henry O'Reilly and Hugh Allen, Ed.2. 112p. O. N. Y. 1859. 040 P v.1248  
Quotes editorial opinions in the city of New York on the difficulties and dangers besetting the state canal system and the necessity and success of the state conventions (p.5-7, 112); also replies of state candidates of all parties to inquiries of the Clinton league on questions of state canal policy (p.8-16).  
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Eight recommendations: Completion of improvements already begun on canals; proper terminal facilities should be immediately provided; the act limiting corporations designed to navigate the canals to a capital stock of \$50,000 should be repealed; New York city should be allowed to carry out its plans for construction of piers, etc.; an act prohibiting the conveyance in perpetuity of any land under water within Greater New York; act regulating fees and charges of elevators should be amended; canal piers should again be reserved exclusively for canal boats.

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Historical sketch. 1:690-715; 2:54-58, 353-59, 540-50, 592-855.

## SHIP CANALS.

Sloop canal from the lakes to the Atlantic by way of the Susquehannah, upper part to be through New York. (see Niles' register, 1833, 45:203-4) 900 words. 305 qN59

Extracts from the memorial to Congress and the address to the citizens of the United States.

Morris, Gouverneur. New York; her internal improvements, present and prospective. (see Amer. R. R. jour. 1834, 4:84) 1400 words. 620.5 qJ2

For ship canal between the Hudson and Lake Ontario.

New York citizens. Petition asking an appropriation for the survey of a ship canal from Lake Erie to Lake Ontario, Jan. 6, 1834. 5p. O. (U. S. Ex. doc. 28, 23d Cong., 1st Sess.)

Niagara canal. (see Alb. daily advertiser, Feb. 20, 1834) 1000 words.

Report of commissioners appointed Apr. 5, 1798, to have route surveyed, etc.

Oswego citizens. Petition relative to a survey of a ship or steamboat canal from Albany to Oswego. 9p. (Ass. doc. 1834, no. 367)

Report on the location and expense of a ship canal around Niagara Falls, with a report of a select committee to the Assembly, Apr. 14, 1834, relating to the connection from Oswego to the Hudson. 16p. map, O. N. Y. 1834. 040 P v.145

Includes reports of N. S. Roberts and Benjamin Wright.

Robinson, O. Preamble and resolution relative to the construction of national works in aid of the natural facilities for communication between the states. 2p. (Ass. doc. 1834, no. 166)

Utica citizens. Memorial relative to a sloop and steamboat navigation between Utica and Oswego. 4p. (Sen. doc. 1834, no. 104)

Jervis, John Bloomfield, Holmes Hutchinson, and F. C. Mills. Letter to the canal board relative to a ship canal from Utica to Oswego. (see Amer. R. R. jour. 1835, 5:373-77) 8400 words. 620.5 qJ2

In favor of enlargement, but not to a ship canal.

Johnson, Edwin F. Communication to state central executive committee on the subject of the proposed Ontario and Hudson steamboat canal. (see Amer. R. R. jour. 1835, 4:330-34) 6000 words. 620.5 qJ2

Called forth by a document presenting the merits and demerits of the project of the proposed Ontario and Hudson ship canal, by J. B. Jervis, Holmes Hutchinson and F. C. Mills.

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Article from *Chicago American* and editorial. The subject demands serious attention of Congress.
- Utica citizens. Proceedings at a public meeting, Feb. 5, 1835, to take measures to effect the construction of a ship canal between Lake Ontario and the Hudson river. 12p. (Ass. doc. 1835, no. 158)
- Ship canal. (see *Amer. R. R. jour.* 1836, 5:305-6, 440, 449-50, 498) 620.5 qJ2  
Discussion by "Harlem," "M," "J. E. B." and "Utica," concerning the estimate for a canal around Niagara Falls and from Oswego by way of Utica to the Hudson.
- Williams, W. G. Report of a survey around the Falls of Niagara, with a view to the construction of a ship canal, made during 1835, transmitted by the secretary of war, Apr. 14, 1836. 75p. illus. maps, O. (U. S.—House—24th Cong. 1st Sess. Doc. 214)  
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Plea for the construction of the former named canal.
- Oneida county citizens. Memorial of sundry inhabitants of Oneida county against the enlargement of the Erie canal, and for the construction of a ship canal from Oswego to Utica. 9p. (Ass. doc. 1837, no. 132)
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Report of public meeting at Oswego in opposition to the project.
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Minority report, 4p. Ass. doc. 1853, no. 76.

Stuart, Charles Beebe and E. W. Serrell. Engineers' report on the Niagara ship canal made to the commissioners appointed by the Legislature of New York, Feb. 15, 1854. 26p. 1 map, O. N. Y. 1854. 040 P v.273; or, v.2124 or v.953

Burroughs, Silas M. and others. Report of a committee relative to a grant of lands to aid in the construction of a ship canal around the Falls of Niagara, May 10, 1858, to accompany bill (H. R. no. 432). 12p. O. (U. S.—House—35th Cong., 1st Sess. Rep. 374)

Buffalo citizens, Committee of. Report of their work in presenting the need of the defense of the lakes and northwestern frontier. 8p. O. Buffalo, 1862. 386

Ely, Alfred. Enlargement of canal-locks of New York for national defence, speech delivered in the House of Representatives, June 30, 1862, 13p. O. Wash. 1862. 040 P v.2438

N. Y. (state)—Canals, Committee on. Report in reference to the enlargement of the locks on the Erie, Oswego and Sodus canals, and the enlargement of the Champlain canal for military and defensive purposes. 20p. (Ass. doc. 1862, no. 190) 040 P v.1233

Statistics of size, revenues and estimated cost of enlargement of canals; commercial advancement of New York state in its topographical and geographical position.

N. Y. (state)—Canals, Committee on. Report on the bill to provide for the enlargement of the Erie, Oswego and Champlain canals, so as to admit the passage of gunboats and vessels of war, Apr. 10, 1862. 16p. map. (Sen. doc. 1862, no. 100) 040 P v.1825 or v.2124

N. Y. (state)—Engineer and Surveyor. Report on enlargement to admit passage of gunboats. 8p. map. (Ass. doc. 1862, no. 174)

New York, Chamber of commerce of. Memorial on canal enlargement for defense of lakes. 4p. (Sen. doc. 1862, no. 110)

Favors the enlargement of one tier of locks of the Erie and Oswego canals, sufficient to permit the passage of mail-clad vessels.

Resolutions for the appointment of a committee to memorialize the governments of this state and of the Union regarding the enlargement of the Erie and Oswego canals, Apr. 3, 1862; and report of that committee, May 1. (*see* Annual report, 1862, 5:24–25, 34–35) 700 words. 381 N42

Ruggles, Samuel Bulkley. Memorial in behalf of the state of New York on the subject of the enlargement of the locks of the Erie and Oswego canals, adapting them to the defense of the lakes, transmitted by the President to Congress, June 13, 1862. 13p. (U. S.—House—37th Cong. 2d Sess. Ex. doc. 128)

U. S.—Military affairs, Committee on. Report on petitions from Millard Fillmore and others, soliciting Congress to adopt measures for enlarging the locks of the Erie and Oswego canals to a size sufficient to pass vessels adequate to the defence of the lakes, June 3, 1862. 5p. O. (U. S.—House—37th Cong. 2d Sess. Rep. 114)

A new ship canal proposed by a new route. (*see* Amer. R. R. jour. 1863, 36:430–31, 446–47) 1200 and 800 words. 620.5 qJ2

From Erie canal at Macedon to Seneca lake at Geneva, through the lake and a canal from its head to Susquehanna river, down the river to near "Great Bend," by canal to Delaware river, down the river, thence by canal to the Hudson at Haverstraw.

Chicago—Statistics, Committee on. Necessity of a ship canal between the east and the west; report submitted to the national convention, June 2, 1863. 45p. O. Chicago, 1863.

040 P v.1825

Canals vs. railroads (p.25-31), commercial and military aspects (p.33-44).

Day, Horace H. Memorial for the construction of a ship canal around the Falls of Niagara, Feb. 9, 1863, with the report of the committee on naval affairs, Mar. 3, 1863, to accompany bill (H. R. 783). 2p. O. (U. S.—House—37th Cong. 3d Sess. Rep. 54)

Defense of the Great Lakes, its necessity and the quickest, cheapest and best way to accomplish it. 16p. O. Ithaca, 1863.

040 P v.1825

Facts and views submitted to United States Congress and to the New York Legislature by citizens in the vicinity of Cayuga lake.

Enlargement of the Champlain canal. (see Amer. R. R. jour. 1863, 36:943, 949-50) 1200 words.

620.5 qJ2

Enlargement of the New York canals. (see Amer. R. R. jour. 1863, 36:19-20) 1800 words.

620.5 qJ2

Against the enlargement by the general government for military and naval purposes.

Military canal enlargement. (see Amer. R. R. jour. 1863, 36:97-98) 500 words.

620.5 qJ2

Opposed to enlargement of canals by Congress, ostensibly for military purposes.

National ship canal convention, Chicago. Proceedings, Jan. 2 and 3, 1863. 248p. O. Chicago, 1863.

040 P v.1825

Contents: Advantages of proposed enlarged canals, by S. B. Ruggles, p.45-52; necessity of a ship canal between the east and the west, national, commercial and military aspects, p.63-105; Niagara ship canal and proposed routes, by W. G. Williams, appendix, p.111-14; enlargement of the New York canals, by N. S. Benton, p.120-27; memorial to the President and Congress appendix, p.225-46.

In appendix are letters expressing views of Richard Yates, T. O. Howe, E. F. Johnson, J. A. Poor and others.

New York, Chamber of commerce of. Memorial to Congress in favor of enlarging the canals for the defense of the lakes, Jan. 7, 1863. 10p. (U. S.—Senate—37th Cong. 3d Sess. Mis. doc. 12)

Also in a pamphlet, 15p. O. N. Y. 1863 (386).

Niagara Falls ship canal. (see Amer. R. R. jour. 1863, 36:501-2, 1239) 1400 and 300 words.

620.5 qJ2

Editorial on the speech of Hon. D. C. Littlejohn before the Chamber of commerce of New York, for the canal.

Niagara ship canal, its military and commercial necessity. 15p. maps, O. N. Y. 1863.

040 P v.1825 or 953

Ottawa and Champlain canals. (see Amer. R. R. jour. 1863, 36:525-26) 1300 words.

620.5 qJ2

Ruggles, Samuel Buckley. Report of S. B. Ruggles, commissioner, appointed by the Governor, in respect to the enlargement of the canals for national purposes. 105p. (Ass. doc. 1863, no. 174; or, Sen. doc. 1863, no. 110)

Reports, state documents, memorials and correspondence concerning Mr. Ruggles' investigations and his relations with the national government on the subject of New York canals.

Ship canal between the St. Lawrence and the Hudson. (see Amer. R. R. jour. 1863, 36:829-30, 901-3) 4800 words.

620.5 qJ2

Arguments against Erie canal and other routes and in favor of the Champlain route for a ship canal.

U. S.—Naval affairs, House Committee on. The naval defence of the Great Lakes, report submitted Jan. 1863. 16p. O. (U. S.—House—37th Cong. 3d Sess. Rep. 4) 040 P v.1825

U. S.—Select committee. Report on the Niagara ship canal, Mar. 3, 1863, to accompany bill (H. R. 782). 18p. O. (U. S.—House—37th Cong. 3d Sess. Rep. 53)

Wisconsin—Legislature. Memorial on the Erie canal, favoring the enlargement, Jan. 28, 1863. 2p. (U. S.—Senate—37th Cong. 3d Sess. Mis. doc. 19)

Cornell, Ezra. Speech on the question of a ship canal connecting Cayuga lake with Lake Ontario, delivered before the Senate, Mar. 14, 1864. 34p. map, O. Alb. 1864. 386

N. Y. (state)—Canal board. Report against proposed use of water from Erie canal by Cayuga and Ontario ship canal. 2p. (Sen. doc. 1864, no. 47) 040 P v.1233

N. Y. (state)—Commerce and navigation, Committee on. Report on the bill for the incorporation of the Niagara ship canal company.. 16p (Sen. doc. 1864, no. 21)

040 P v.953 or v.1825

Urges importance

New York, Chamber of commerce of. Meeting of the committee to which had been referred the bill to incorporate the Niagara ship canal company, for the purpose of hearing communications from the Oswego board of trade. (see Annual report, 1864, 6:145-53) 381 N42  
Remarks of Henry Fitzhugh, p.145-49; of L. B. Crocker, p.149-52.

Parker, A. X. Niagara ship canal proposition; speech in Assembly, 1864. 7p. O. 386

Stuart, Charles B. Report upon the proposed improvements to pass gunboats from tide-water to the northern and northwestern lakes, 1864. 28p. O. (U. S.—House—38th Cong. 1st Sess. Ex. doc. 61)

Wisconsin—Legislature. Memorial asking for the enlargement of the Fox and Wisconsin rivers, improvement of a ship canal around the falls of Niagara, and the improvement of the Erie canal, Apr. 27, 1864. 3p. (U. S.—Senate—38th Cong. 1st Sess. Mis. doc. 110)

Bloodgood, S. DeWitt. Ship canal between the St. Lawrence and Hudson rivers. 16p. O. N. Y. 1865. 040 P v.1825

Communication prepared for the Detroit commercial convention.

Hayes, J. D. Niagara ship canal, published by resolution of the Board of trade. p.5-21, O. Buffalo, 1865. 040 P v.1825

N. Y. (state)—Canal board. Resolutions relative to a ship canal around the Falls of Niagara. 2p. (Ass. doc. 1865, no. 91 or 102)

N. Y. (state)—Canal Department, Auditor of. Communication from Auditor, transmitting resolutions of the Canal board relative to the Niagara ship canal. 2p. (Sen. doc. 1865, no. 41)

——— Niagara ship canal. (see their Annual financial report for 1865, p.43-48)

386 N4261

N. Y. (state)—Canals, Committee of. Report of the minority relative to the Niagara ship canal. 5p. (Ass. doc. 1865, no. 66) 040 P v.1825

Ship canal to Lake Champlain. (see Amer. R. R. jour. 1865, 38:444) 160 words.

620.5 qJ2

From Albany journal. Appropriation of \$5000 for survey.

An act to incorporate the Niagara ship canal company, passed Apr. 24, 1866. (see Laws of New York)

Day, Horace H. comp. Testimonials in favor of ship canals with inclined planes, especially applicable to the proposed work around Niagara Falls. 17p. O. N. Y. 1866.

040 P v.1825

N. Y. (state)—Canal board. Communication on probable effect of construction of Niagara ship canal. 8p. (Ass. doc. 1866, no. 172) 040 P v.1825

——— Proceedings, Mar. 28, 1866; report on the Niagara ship canal, followed by an extract from the report of the Auditor, made Jan. 4, 1866. 15p. O. 040 P v.1947

Niagara ship canal. (see Commer. and finan. chron. 1866, 2:163-64, 549-50) 2000 and 1360 words. 332 qC73

Editorial on effect of construction on commerce.

Ship canals. (see Commer. and finan. chron. 1866, 3:815-16) 1700 words. 332 qC73

Editorial on Niagara ship canal.

Alvord, Thomas G. Canals and state finances, remarks delivered in state constitutional convention, Sept. 3 and 4, 1867. 36p. O. Alb. 1867. 342.7472 M7

Favors taxing the state in order to make the Erie canal a ship canal.

N. Y. (state)—Canal board. Report on employment of counsel to represent interests of state in matter of Niagara ship canal. 12p. (Sen. doc. 1867, no. 35)

U. S.—House. Bill to provide for the construction of a ship canal around the Falls of Niagara, 1867. 4p. O. 040 P v.1825

Blunt, C. E. Surveys and estimates for a ship canal between Lakes Erie and Ontario. (see U. S.—Engineer department. Annual report for 1868, p.271-93) 627 I2

Also U. S.—House—40th Cong. 2d Sess. Ex. doc. 197.

Mass.—Legislature. Resolutions requesting their senators and representatives in Congress to urge the passage of such legislation as will insure the construction of a ship canal connecting Lakes Erie and Ontario, June 18, 1868. 1p. (U. S.—House—40th Cong., 2d Sess. Mis. doc. 139)

Churchill, John C. Niagara ship canal, speech delivered in the House of Representatives, Jan. 15, 1869. 8p. O. Wash. 1869. 040 P v.1859

Humphrey, James M. Niagara ship canal. (see Congressional globe, 1869, v.81, pt.3. Appendix, p.53-54) N. Y. state law lib.

Speech in the House of Representatives, Jan. 14, 1869. Followed by discussion (p.54-55).

N. Y. (state)—Governor. Message. (Ass. jour. 1869, 92:19)

"Protest against the proposition that it is the duty of the general government to interest itself in our canals and ultimately to acquire control of them."

Paine, Halbert E. Niagara ship canal. (see Congressional globe, 1869, 81:371-76)

N. Y. state law lib.

Speech in House of Representatives, Jan. 14.

Van Horn, Burt. Niagara ship canal. (see Congressional globe, 1869, 79:367-71)

N. Y. state law lib.

Speech on House bill no. 1202, Jan. 14. Discussion by N. B. Judd, B. F. Butler, E. B. Washburne, W. B. Allison, J. A. Logan, J. H. Sypber, Demas Barnes, R. P. Spalding, James Mullins, B. C. Cook and J. C. Churchill (p.394-405).

Hadfield, Robert. Memorial as to the proposed Niagara ship canal, the course of commerce on the lakes, etc.; adopted by the Buffalo board of trade. (see Buffalo board of trade. Statement of trade and commerce for 1870, p.109-20) 381 B86

National commercial convention, Detroit, 1871. Niagara ship canal, memorial and report of the executive committee. 73p. O. (U. S.—House—42d Cong. 3d Sess. Mis. doc. 22)

Report. 65p. O. Detroit, 1872.

380

Contents: Address by James Young, p. 18-22; remarks by John McLennon, p.22-24; history of Niagara ship canal project, p.24-33; report by Buffalo Board of trade, p.33-41; memorial to Congress, p.41-42; opinions of L. A. Thomas of Iowa, Levi Underwood of Vermont, Mr. King of Ohio, D. G. Fort of New York, Gen. Sibley of Minnesota, J. R. Osborne and J. I. Post of Ohio, J. V. N. Lothrop of Michigan and Gov. Fairchild of Wisconsin.

Niagara ship canal project. Editorial. (see Commer. and finan. chron. 1871, 13:829-30) 1300 words. 332 qO73

New York produce exchange. Hudson and Champlain proposed ship canal scheme. (see Annual report, 1872-73, p.223-25) 381 N423

The New York canals. (see Annual report, 1872-73, p.231-50, 279-303 and 382-400) 381 N423

Diversion of trade; proposed enlargement of one tier of locks on the Erie and Oswego canals; proposed Oswego and Hudson river ship canal; proposed Niagara ship canal; tonnage; steam on the canals, statistics.

Niagara ship canal and the produce exchange. Editorial. (see Commer. and finan. chron. 1872, 14:281) 500 words. 332 qO73

N. Y. (state)—Assembly. Resolutions relative to government aid to improve the Erie canal. 4p. (Ass. doc. 1873, no. 58)

U. S.—Commerce, Committee on. Ship canal; report, Feb. 13, 1873, to accompany bills (H. R. 69, 167, 3014 and 3052). 28p. O. (U. S.—House—42d Cong. 3d Sess. Rep. 76)

Niagara ship canal, p.1-9.

Enlargement of locks of Erie and Oswego canals, p.20-28.

Weed, Smith M. Ship canal from the Hudson river to Lake Champlain, speech in Assembly Apr. 15, 1873. 31 p. map, O. Albany, 1873. 040 P v.2124

U. S.—Transportation routes to the seaboard, Select committee on. Report with appendix and evidence, 1874. 2v. O. (U. S.—Senate—43d Cong. 1st Sess. Rep. 307. 2 pts.)

A thorough work. Conclusions testify to the cheapness of water transportation compared with railway transportation, and the necessity of the national government's assistance in connecting the waterways.

Wilson, John M. Report of surveys and estimates for the enlargement and improvement of the third division of the northern transportation route, made in accordance with act of Congress, Dec. 24, 1874. (see U. S.—Engineer department. Annual report for 1875, pt.2, p.534-607) 627 I2

Also U. S.—Senate—43d Cong. 2d Sess. Ex. Doc. 19, pt. 1.

Includes reports of assistant engineers. Octave Blanc, J. S. Lawrence and C. A. Fuller on the Erie canal route, Oneida ship canal route, and Champlain ship canal route, respectively.

- Scott, F. J. National works. 18p. O. Toledo, 1878. 380  
Improvement of Erie canal as a national work.
- Lake improvement convention, St. Paul, Minn. Merits of routes from Great Lakes to Atlantic ocean. (see Report of proceedings, 1879, p.25-27) 386
- Seymour, Horatio. Commercial advantages of New York, and maritime law on the Erie canal. (see his Writings collected. v.2. Speech at Utica, Sept. 15, 1880, p.16-20; also Addresses at New York, Oct. 8, 1880, p.16-18) 308 Se91
- Seymour, Horatio and Don Cameron. Canals of New York; state rights against federal usurpation, speeches. 7p. O. (in Seymour, Horatio, Writings collected. v.2) 308 Se91  
Clipping from *New York herald*, Oct. 30, 1880.
- Sweet, Elnathan, jr. Canal problems. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1884, p.10-15) 626 L1  
Favors canal 18 ft. deep and 100 ft. wide at bottom with locks 450 ft. long and 60 ft. wide.
- U. S.—Railways and canals, Committee on. Report to accompany bill (H. R. 3538) to provide for the permanent improvement of the Erie canal, and to aid in maintaining the same free to the commerce of the United States, 1884. 8p. O. (U. S.—House, 48th Cong. 1st Sess. Rep. 628)
- Sweet, Elnathan, jr. The radical enlargement of the artificial waterway between the lakes and the Hudson river. (see Amer. soc. civ. engs. Transactions, 1885, 14:37-140) 620.6 N2  
Discussion by E. L. Corthell, E. P. North, W. S. Pope, O. M. Poe, M. M. Drake, A. P. Boller, E. H. Walker, E. S. Chesbrough, W. W. Evans, T. C. Clarke, N. M. Edwards, W. E. Merrill, J. D. Van Buren, jr., D. F. Henry, O. Chanute, Clemens Herschel, J. N. Tubbs, T. C. Keefer, Simon Stevens, E. L. Harris, Theodore Cooper and F. Collingwood.  
An extract is given in U. S.—House—52d Cong. 1st Sess. Rep. 1023, Appendix F, p.42-44.  
The proposition was to increase the depth to 18 feet, width to 100 feet on the bottom, length of locks to 450 feet, and make Lake Erie the summit. Discussion brought out a mass of statistics and opinions. Estimates of cost vary from \$125,000,000 to \$240,000,000.
- U. S.—Railways and canals, Committee on. Report on improvement of the Erie and Oswego canals, Feb. 23, 1886, to accompany bill (H. R. 1577). 7p. O. (U. S.—House—49th Cong. 1st Sess. Rep. 643)
- Miller, J. Bleeker. Shall the Erie canal look to the federal government for its support, as advocated by the Republican platform? 15p. O. N. Y. 1887. 386  
Printed by Young men's democratic club.
- Editorial on the six alternative routes suggested by W. P. Judson for the proposed Niagara ship canal, with map. (see Eng. rec. 1888, 17:282) 140 words. 620.5 qN7  
Maps and estimates based upon surveys made in 1867 by J. S. Lawrence and S. F. Gooding (p.294).
- Palfrey, Carl F. Report on waterway around Niagara Falls of capacity and facilities sufficient to float merchant ships and ships of war of modern build, drawing 20 feet of water, Aug. 19, 1889. p.2434-38, O. (U. S.—House—51st Cong. 1st Sess. Ex. doc. 1, 2, v.2, Appendix 00)  
Also appendix D, p.32-35 U. S.—House—51st Cong., 1st Sess., Rep. 1450.
- Judson, William Pierson. From the West and Northwest to the sea by way of the Niagara ship canal. 24p. maps, O. n.p. 1890. 626.9 P0a  
Includes the report of C. F. Palfrey and text of bill directing the U. S. to make a ship canal around Niagara Falls.
- U. S.—Railroads and canals, Committee on. Report on the ship canal around the falls of Niagara, Apr. 14, 1890, to accompany H. R. 582. 35p. O. (U. S.—House—51st Cong. 1st Sess., Rep. 1430)  
Appendix A. Report of W. G. Williams, p.12-19.  
" B. Report of survey by C. E. Blunt, p.20-26.  
" C. Report of committee on commerce, p.27-31.  
" D. Report of C. F. Palfrey, p.32-35.
- Bates, William W. Deep water navigation through the lakes and to the sea. (see Deep waterways convention, Detroit, 1891. Proceedings, p.62-66) 387
- Corthell, E. L. An enlarged waterway between the Great Lakes and the Atlantic seaboard. (see Sci. Amer. sup. 1891, 32:12,924-28) 10,000 words. 605 fN6  
Extract of paper read before the Canadian society of civil engineers, Feb. 12, 1891, with discussion.  
Different routes for ship canal discussed.
- Farwell, Jesse H. Utilization of convict labor for work on a ship canal. (see Deep waterways convention, Detroit. 1891. Proceedings, p.53) 387
- Smith, Denison B. Deeper channels in the lakes and an outlet to tide-water. (see Deep waterways convention, Detroit. 1891. Proceedings, p.67-72) 387

Great Lakes and Hudson river ship canal. (*see* Eng. news, 1892, 27:457-58) 620.5 fN4  
 Criticism of F. P. North's article in the Forum, May, 1892. Money value of Great Lakes  
 as a traffic route.

N. Y. (state)—Engineer and Surveyor. Proposed ship canal. (*see* Annual report for 1892,  
 p.24-25) 626 L1

North, Edward P. Ocean traffic by the Erie canal. (*see* Forum, May, 1892, 13:371-78)  
 051 F77

U. S.—Railways and canals, Committee on. Report favoring a survey for a ship canal from  
 the Great Lakes to the navigable waters of the Hudson river, Apr. 8, 1892. 49p. O. (U. S.—  
 House—52d Cong. 1st Sess. Rep. 1023)

*Contents of appendix:* Statements by S. A. Thompson and Capt. Kingman, p.15-22 and 22-28.  
 Open letter in regard to commerce of Lake Superior, by Horatio Seymour, p.28-32.  
 From the West and Northwest to the sea, by W. P. Judson, p.32-37.  
 Waterway around Niagara Falls sufficient to float ships drawing 20 ft. of water, by C. F.  
 Palfrey, p.37-40.

Letter by Verplanck Colvin, p.40-42.  
 Radical enlargement of the artificial waterway between the lakes and the Hudson, by El-  
 nathan Sweet, p.42-44.  
 Tables, p.45-49.

Judson, William Pierson. An enlarged waterway between the Great Lakes and the Atlantic  
 seaboard. 16p. O. n.p. 1893. 626.9 Poa

Boardman, Irving. Proposed ship canal. (*see* Sci. Amer. Sept. 29, 1894, 85:199) 640 words.  
 605 fK5

From Oswego to Lake Oneida, the summit, thence a straight cut to Utica, along Erie canal  
 to Schenectady and from there to the Hudson south of Albany.  
 Editorial on scheme, Eng. mag. 1894, 8:299-300, 450 words (620.5 P1).

Clarke, Thomas Curtis. New York and deep water to the lakes, with an appendix on cost of  
 transportation. (*see* International deep waterways association. Proceedings of the annual  
 convention. 1895. 1:273-80) 386 In8

Discussion of paper, p.280-85.

Farmers national congress of America. Resolutions adopted in annual session at Atlanta,  
 Dec. 27, 1895. 4p. O. (U. S.—Senate—54th Cong. 1st Sess. Doc. 44)

Flower, Frank Abial. The deep water movement. (*see* International deep waterways  
 association. Proceedings of annual convention. 1895. 1:5-24) 386 In8

Himes, Albert J. Report on an enlarged canal via the Oswego route. (*see* N. Y. (state)—  
 Engineer and Surveyor. Annual report for 1895, p.51-86) 626 L1  
 Profile map in pocket of book cover.

N. Y. (state)—Senate. Preamble and resolution relative to maintenance of canal system of  
 the state of New York. 2p. (Sen. doc. 1895, no. 17)  
 To ask United States to bear part of annual expense.

Ship canal projects, Cleveland waterways convention. Editorials from different publications.  
 (*see* Public opinion, 1895, 19:580-82) 071 qP96

Smalley, E. V. From the Great Lakes to the sea. (*see* Amer. rev. of revs. 1895, 12:305-8)  
 2500 words. 052 R321

Against \$9,000,000 improvement; for a ship canal from Lake Ontario to New York.

Smith, Denison B. Necessities and advantages of a ship canal to the ocean. (*see* Inter-  
 national deep waterways association. Proceedings of the annual convention. 1895. 1:81-87)  
 386 In8

Clarke, Thomas Curtis. Effect of depth upon artificial waterways. (*see* Amer. soc. civ. engs.  
 Transactions, July, 1896, 35:1-5) 620.6 N2

Also in *Proceedings of the annual convention* of the International deep waterways associa-  
 tion, 1895, p.343-52 (386 In8).

Discussion by E. P. North, and C. N. Dutton, p.6-28; letters from Richard Lamb, L. C.  
 Sabin, L. J. Le Conte, L. M. Haupt, W. J. Babcock and T. T. Johnston, p.29-40.

Waterways from the ocean to the Lakes. (*see* Scribner, Jan. 1896, 19:103-13)  
 4000 words. 051 Scr3

Interesting illustrated historical account of the Erie canal, cost, transportation, rates, etc.,  
 with comments in favor of deepening its channel; also brief review of the history of ship  
 canals.

Lakes and Atlantic waterway. (*see* Western soc. of engs. Journal, Jan. 1896, p.52-54)  
 1400 words. 620.6 P6

Memorandum in regard to certain profiles designed to exhibit the ruling points, and accom-  
 panied by four profile sheets. Compiled by the publication committee from the records of the  
 sanitary district of Chicago.



- St. Lawrence water route to the sea. (see Eng. news, 1896, 35:207-8) 620.5 fN4  
Comparison of canals and routes.
- Survey of a Great Lakes and Hudson river ship canal. (see Eng. news, 1896, 36:329-30) 620.5 fN4  
Estimates based on a "hasty reconnaissance" made by A. J. Himes for a 20-ft. deep waterway from Lake Ontario to the Hudson river.
- U. S.—Deep waterways commission. Extracts from the report of the commission, prepared by J. B. Angell, J. E. Russell, L. E. Cooley; reprint of parts relating to the Oswego-Oneida-Mohawk route from Lake Ontario to the Hudson river, and drawings. 13p. maps, O. n.p. 1896. 626.9 P6b
- U. S.—Railways and canals, Committee on. Report amending House bill 34, for ascertaining cost of ship canal from Great Lakes to Hudson river, Feb. 18, 1896. 50p. O. (U. S.—House—54th Cong. 1st Sess. Rep. 423)
- Barnstow, F. M. and T. A. Patterson. St. Lawrence—Champlain route; special report on preliminary reconnaissances. (see U. S.—Deep waterways commission. Report. 1897. p.68-68) 386 Un3  
Also U. S.—House—54th Cong. 2d Sess. Doc. 199.  
1. St. Lawrence rapids, Ogdensburg to St. Regis.  
2. St. Francis and Champlain canal route.  
3. South Bay route, Champlain-Hudson divide.  
See also page 49; profile no. 9.
- Deep waterways, International commission on. Deeper waterways from the Great Lakes to the Atlantic, reports of the Canadian members. 62p. illus. map, O. Ottawa, 1897. 386
- Economy of the proposed deep waterway from the Great Lakes to the Atlantic. (see Eng. news, 1897, 38:315-363) 4000 words. 620.5 fN4  
Criticisms of Maj. T. W. Symons' report by T. C. Clarke and C. N. Dutton with reply and editorial comment.
- From the lakes to the ocean. (see R. R. gas. Feb. 5, 1897) 1400 words. 385 fR132  
Editorial on the report of the U. S. Deep waterways commission.
- Joining the Great Lakes to the sea. (see Bradstreet's, 1897, 25:55) 800 words. 330.5 fB72
- Suggestions of U. S. deep waterways commissioners.
- Judson, William Pierson. Special report on Oswego-Oneida-Mohawk route, May 20, 1896. (see U. S.—Deep waterways commission. Report. 1897. p.50, 59-63) 386 Un3  
Accompanied with map no. 11a and profile no. 11.  
Aims to show existing conditions of essential features.
- Lake Erie to Lake Ontario through the Niagara river and proposed ship canal and Welland canal. (see U. S.—Deep water commission. Report. 1897, p.45-46) 386 Un3  
With profile no. 5.
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Editorial discussion of the projects being considered to connect the Great Lakes with the sea.
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- Snyder, Carl. From the lakes to the sea; an account of the inventions and devices that have now rendered feasible a great ship canal. (see Amer. rev. of revs 1897, 16:563-78) 9000 words. 052 R321
- Outline of project; the railway mania and its results; Chicago's epoch-making achievements, the drainage canal; the pneumatic high lift-lock; ship canal, St. Lawrence-Champlain route.
- U. S.—Deep waterways commission. Report prepared at Detroit, Mich. Dec. 18-22, 1896, by the commissioners, accompanied by the report on technical work and the several topical reports and drawings pertaining thereto, 1897. 263p. illus. maps, O. (U. S.—House—54th Cong. 2d Sess. Doc. 192) 386 Un3  
Extracts off above report, with editorial comment, Eng. news, 1897, 37:47, 84-87, 88-90 (620.5 fN4).

- **Waterways from the Great Lakes to the Atlantic.** (*see Eng. news*, 1897, 38:312-13) 620.5 fN4  
Abstract of T. W. Symons' report on proposed ship canal with editorial comment.
- Canals for large traffic.** (*see Eng. mag. Apr. 1898*, 15:133-34) 600 words. 620.5 P1  
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- Canby, H. S.** A ship canal to the sea. (*see Yale Sci. M. Apr. 1898*) 2000 words.  
Discusses the question of transportation, favoring the construction of a ship canal, and considering the new lock invented by C. N. Dutton.
- Deep waterways to the Atlantic.** (*see Eng. mag. Jan. 1898*, 14:667-8) 620.5 P1  
Short article giving estimated cost of a ship canal from the Great Lakes to New York city.
- Editorial on the canal problem—Legislature adjourned without final action.** (*see Eng. news*, 1898, 39:224) 300 words. 620.5 fN4
- Gibbons, J. H.** The Great Lakes and the modern navy. (*see No. Amer. rev. April, 1898*, 166:437-47) 4000 words. 051 N81  
Shows that the development of the iron and steel industry of this region has an important effect on shipbuilding; discusses the projects to connect the lakes with the sea by improvements in canals and the result this would have on our merchant marine, etc.
- Federal ownership of New York's canal.** (*see Sea, Mar. 17, 1898*) 2900 words.  
Hearing before the Senate's judiciary committee on Mar. 9 on the Pavey resolution.
- Mayer, Joseph.** Economic depth for canals of large traffic. (*see Amer. soc. civ. eng. 1898*, 39:273-84)  
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- Mayer, Joseph and T. C. Clarke.** Economic depth for canals of large traffic. (*see Eng. news*, 1898, 39:155-56) 3200 words. 620.5 fN4  
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- Proposed canal from American lakes to Atlantic.** (*see Engineering, Mar. 11, 1898*, 65:309-10) 1100 words. 620.5 fM6  
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- Raymond, C. W.** Letter, submitting an estimate for surveys and examinations for deep waterways between the Great Lakes and Atlantic ocean, 1898. 3p. O. (U. S.—House—55th Cong. 2d Sess. Doc. 282)
- Symons, Thomas W.** The future of the Erie canal. (*see Eng. rec. Mar. 19, 1898*, 37:340-41) 3000 words. 620.5 fN4  
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- Wright, John A. Collier.** Brief upon water transportation through the Great Lakes to the seaboard, with special reference to projected deep waterways to the Hudson, dated Dec. 31, 1898. (*see N. Y. (state)—Commerce commission. Report. 1900. v.1, p.182-202*) 380 N42
- Bowers, L. M.** The construction of a ship canal by the federal government and the abandonment of the old canals; reply to circular letter of May 1. (*see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.61-63*) 386 N4269  
In *Ass. doc.* 1900, no. 79.
- Coolley, Lyman E.** Program of improvements pending construction by U. S. government of ship canal via Lake Champlain, the state work to include a permanent barge route from Lyons to the Hudson; reply to circular letter of May 1. (*see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence, 1900, p.65-66*) 386 N4269  
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- Niles, Henry T.** Views against a ship canal and in favor of one for 1500-ton barges; reply to circular letter of May 1. (*see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence, 1900, p.112-16*) 386 N4269  
In *Ass. doc.* 1900, no. 79.
- North, Edward P.** Favors a ship canal on Erie route, and pending construction suggests deepening of present prism to facilitate navigation and encourage boat construction; reply to circular letter of May 1. (*see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.102-7*) 386 N4267  
In *Ass. doc.* 1900, no. 79.

**Rafter, George W.** The economic relation of the proposed deep waterways to the state of New York. (see *Technology Quarterly*, Mar. 1899, 12:43-50) 3800 words. 605 O7

Reviews improvements in transportation by way of the Great Lakes, Oswego and Mohawk route and discusses the present project to permit large boats to pass from the Great Lakes to tide-water.

**Raymond, C. W., Alfred Noble, and G. Y. Wisner.** Report of the board of engineers on deep waterways and recommendations relating to appropriations therefor, 1899, transmitted by the secretary of war. 4p. O. (U. S.—House—55th Cong. 3d Sess. Doc. 110)

**Sloan, George B.** Reply to circular letter of May 1, favoring completion of state project of 1895, and hoping for construction of ship canal by federal government. (see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.96-99) 386 N4269  
In *Ass. doc.* 1900, no. 79.

**Tausig, F. W.** Reply to circular letter of May 1. (see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.135-37) 386 N4269  
In *Ass. doc.* 1900, no. 79.

Enlargement of Erie canal will not meet railway competition; uncertainty as to success of barge canal; ship canal would not benefit New York.

**Coast communication with the Great Lakes.** (see *Eng. mag.* Dec. 1900, 20:455-57) 700 words. 620.5 P1

"21-foot waterway is adequate and best."

**From lakes to seaboard.** (see *Marine rev.* Feb. 8, 1900) 1700 words.

A view of conditions presented to ship builders of the Great Lakes and the Atlantic coast by the opening of Canada's St. Lawrence river canals, and the proposed New York state improvements. Illustrated.

**Howell, D. J.** Methods and results of surveys and borings for Oswego-Mohawk ship canal route. Illustrated. (see *Eng. news*, 1900, 43:402-5, 418-22) 620.5 fN4

Two hundred million. (see *Marine rev.* July 12, 1900) 2000 words.

Considers the final report of the deep waterways commission dealing with routes for a ship canal within U. S. territory from the Great Lakes to the Atlantic.

**U. S.—Deep waterways, Board of engineers on.** Report on deep waterways between the Great Lakes and the Atlantic tide-waters, Dec. 7, 1900. 2v. illus. atlas, Q. Wash. 1900. (U. S.—House—56th Cong. 2d Sess. Doc. 149) 626.9 qQ0  
Atlas, v3.

Includes the following reports: *Comparison of waterways*, by G. Y. Wisner, p.235-47; *Relative advantages of the 21 and 30-foot waterways*, by C. W. Raymond, p.247-73; *Lake Erie regulation*, by G. Y. Wisner, p.273-98; *Regulation of Lake Champlain*, by G. Y. Wisner, p.321-28; *Niagara route and Champlain route, Hudson river division, flood measurements Mohawk river levels from Hudson river to Lake Ontario*, by C. S. Harrison, p.338-98; *Champlain route, St. Lawrence division*, by J. W. Beardsley, p.398-425; *Champlain route, northern division*, by F. P. Davis, p.425-42; *Oswego-Mohawk route, western division*, by A. J. Himes, p.443-99; *Oswego-Mohawk route, eastern division*, by D. J. Howell, p.500-62; *Tidal Hudson*, by H. F. Dose, p.562-71; *Character of materials on deep waterway routes*, by G. Y. Wisner, p.957-71; *Diamond drill borings*, by R. C. Smith, p.974-91.

**Mayer, Joseph.** Canals between the lakes and New York. (see *Amer. soc. civ. engs. Transactions*, 1901, p.207-23) 7000 words. 620.6 N2

Discussion by T. W. Symons, Isham Randolph and Archibald Schenck, p.240-333.

Also in *Proceedings of the society*, 1900, p.972-88 and 1084-99.

Examines arguments for and against the construction of this waterway, showing why private capital cannot safely undertake the construction.

**Wisner, George Y.** Economic dimensions for a waterway from the Great Lakes to the Atlantic. (see *Amer. soc. civ. engs. Transactions*, 1901, 45:224-39) 5400 words. 620.6 N2  
Discussion, p.240-333. Favors 21-foot waterway.

**N. Y. (state)—Legislature.** Resolution expressing appreciation of labors of Major T. W. Symons. 2p. (Sen. doc. 1902, no. 35)

**Cape, E. G. M.** The projected Lake Champlain and St. Lawrence ship canal. (see *Eng. rec.* Apr. 18, 1903, 47:400) 900 words. 620.5 fN7

Brief consideration of the project, with a discussion of its effects on freight from the Great Lakes.

**Deep waterway from the Lakes to the Atlantic.** (see *Eng. news*, Feb. 26, 1903, 49:199-200) 2300 words. 620.5 fN4

Illustrated description of this proposed ship canal, with editorial making comparison with the 1000-ton barge canal project.

**Lake Ontario route for a barge canal.** (see *Eng. news*, May 14, 1903, 49:430-31) 1700 words. 620.5 fN4

Editorial discussion of route, giving the report of W. P. Judson.

**Massie, J. H.** Damming the Niagara river at Buffalo; remarks on the report of T. W. Symons favoring the building of a ship canal round the shoals and rapids, the causes of lowering of the water in Lake Erie, and the proposed remedy by damming the river. Illustrated. (*see Eng. rec.* Apr. 18, 1903, 47:398-99) 1800 words. 620.5 fN7

**N. Y. (state)—Senate.** Resolution relating to the canals. 2p. (Sen. doc. 1903, no. 16)  
To request Congress to complete surveys and examinations of deep waterways between the Great Lakes and the Atlantic tide-waters, including a project for a canal thirty feet deep between Lake Erie and Hudson river.

**Rafter, George W.** Present and proposed waterways in the state of New York; address before the Rochester chamber of commerce, Apr. 6, 1903. 11p. O. 386  
In favor of a deep waterway to be paid for by the national government.

**Admiralty jurisdiction over state canals.** (*see Central law journal*, Jan. 8, 1904, 58:21-23)  
N. Y. state law lib.

## ERIE CANAL.

### Early projects and projectors.

*See also* Material relating to history and construction of more than one canal.

**Moore, H.** Letter to the Earl of Hillsborough, Aug. 1768, containing suggestions for a canal and locks around Canajoharie Falls on the Mohawk river. (*see O'Callaghan, E. B. ed. Documents relative to the colonial history of New York*, 8:93) 974.7 qN421

**Vanderkemp, Francis Adrian.** A forecaste of the Erie canal, July 13, 1792. (*see Buffalo historical society. Publications.* 1880. 2:40-41) 974.797 B86  
In "Extracts from the Vanderkemp papers."

**Howley, Jesse.** Letter to Erastus Granger, July 12, 1807; projection of Erie canal. (*see Turner, Orsamus. Pioneer history of the Holland purchase, 1850. Appendix, p.666-68*) 974.79 T85

**Colden, Cadwallader David.** Communication by canals in New York, 1810-14. (*see his Life of Robert Fulton.* 1817. p.201-5) 926.2 F951

**Facts relating to early history of Erie canal project, 1795-1816.** (*see Haines, C. G. comp. Public documents.* 1821. Introduction, p.48-52.) 386 H12

**Watson, Elkanah.** History of the western canals in the state of New York, 1788-1819. p.7-104, 208-12, illus. maps, O. Alb. 1820. 386 W33

Also in volume of pamphlets (040 P v.3).  
**Travels of Elkanah Watson** for investigating possibilities of canal construction and his part in framing the policy of the state.

**Clinton, DeWitt.** Canal policy of the state of New York delineated in a letter to Robert Troup, by Tacitus, 54p. O. Alb. 1821. (*see his Publications collected*) 329.3 D29  
A criticism of the statement that Elkanah Watson projected the canal policy of the state. Discusses early plans for canal construction and men originating them.

**Troup, Robert.** Vindication of the claim of Elkanah Watson to the merit of projecting the lake canal policy, as created by the canal act, Mar. 1792, and also a vindication of the claim of the late Gen. Schuyler to the merit of drawing that act and procuring its passage. 33p. O. Geneva, 1821. 040 P v.3

Also in *Watson's History of the canals of New York* (386 W33).  
**Contents of appendix:** Article from *Geneva gazette*, Dec. 15, 1819, signed "Veridicus," p.1-3; message from the Governor, Dec. 16, 1768, p.3-4; report on inland navigation, by the commissioners of the Land Office, Jan. 3, 1792, p.5; letter by Comfort Tyler, June 19, 1820, p.6-7; letter by Benjamin Wright, July 26, 1820, p.7-8; letter by S. N. Bayard, May 4, 1820, p.8-9; a copy made by a lad of a rough original on early observation of route, p.9-16; articles from the *New York journal*, Jan. 28, and Mar. 17, 1792, signed a "citizen" and "an inland navigator," p.17-25 and 26-32; letter by Philip Schuyler, Mar. 4, 1792, p.32-35; letters by Elkanah Watson, Feb. 1792 and Nov. 27, 1800, p.16-17 and 35-36; letter by Thomas Eddy, Nov. 14, 1820 p.37-38.

**DeWitt, Simeon.** Letter from the surveyor-general of the state to William Darby, Feb. 25, 1822, relative to origin of Erie canal. (*see N. Y. (state)—Canals, Joint committee on.* Laws in relation to the Erie and Champlain canals. 1825. 1:38-42) 386 qN42

**Geddes, James.** Letter from the canal engineer to William Darby, relative to origin of New York canals, Feb. 22, 1822, with map. (*see N. Y. (state)—Canals, Committee on.* Laws in relation to Erie and Champlain canals. 1825. 1:42-46) 386 qN42

Troup, Robert. Letter to Brockholst Livingston on the lake canal policy of the state of New York. 38+34+47 p. O. Alb. 1822. 386 T75

Also in volume of pamphlets (040 P1 v.5).  
Appendix contains a supplement and twenty letters supporting Elkanah Watson's claim as original projector of the canal policy of the state; also history of canal legislation from 1792-1822.

DeWitt Clinton. (see Alb. daily advertiser, Oct. 21, 1823) 900 words. N. Y. state lib.  
From *Baltimore morning chronicle*. Influence in the evolution and materialisation of the canal project.

— (see Alb. daily advertiser, Oct. 23, 1823.) 600 words. N. Y. state lib.  
Signed "Philo Investigator." Commends his canal policy.

Inland navigation. (see Alb. daily advertiser, Jan. 4, 1823) 1700 words. N. Y. state lib.  
From *Natiopal advocate*. Connection of DeWitt Clinton with the canals.

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DeWitt Clinton's activity on the project.

Facts and observations in relation to the origin and completion of the Erie canal. 36p. illus. O. N. Y. 1825. 040 P1 v.20

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Lossing, Benson John. Early history of canals of New York. (see his *Life and times of Philip Schuyler*. 1860. 2:40, 104, 464-71) 923.57 Sch8

Manley, James R. Eulogium on DeWitt Clinton, delivered July 11, 1828. 22p. O. N. Y. 1828. 923.27 O611  
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Staats, Cuyler. Tribute to the memory of DeWitt Clinton, being a comprehensive sketch of his life together with the proceedings of the New York Legislature and of various corporate and public bodies, also the notices of his death from the most distinguished journals in the U. S., by a citizen of Albany. 204p. illus. O. Alb. 1828. 923.27 C61

Hosack, David. Memoir of DeWitt Clinton, with an appendix containing numerous documents illustrative of the principal events of his life and of the early history of the canals. 530p. illus. Q. N. Y. 1829. 923.27 qC61

Relations of DeWitt Clinton to canal affairs of the state, p.82-119; correspondence and other documents about canals, p.209-504; collection of documents in favor of claims of Gouverneur Morris as originator of Erie canal scheme, p.243-73; letters of Jesse Hawley, also essays first published in 1807 under pseudonym "Hercules" and other documents, p.299-342; letter of Joshua Forman, presenting his claim as a projector, his resolution in Assembly, Feb. 4, 1808, and remarks, p.342-56; services of Thomas Eddy as one of the canal projectors, p.374-78; letter of Jonas Platt, containing an outline of the public measures on the internal navigation of the state, also statement of his own connection with the resolution of Mar. 13, 1810, p. 380-88; notices by S. L. Mitchell of certain events connected with history of the canal, p. 389-94; letter of E. P. Livingston, communicating recollections relative to the Erie canal from 1808-1812, during which time he was a member of the senate, p.395-97; resolutions passed at the Ontario county meeting, Jan. 8, relative to the project of a canal between Lake Erie and the Hudson, (p.425-29); proceedings and resolutions of the public meetings in Albany and in New York, immediately after the removal of Mr. Clinton as canal commissioner, with replies of Mr. Clinton, p.464-80 (Also in *Albany daily advertiser* and *Evening post*, Apr. 1824); letter of W. L. Stone relative to circumstances leading to removal of Mr. Clinton as canal commissioner besides those alleged by his enemies, and including Mr. Cunningham's speech to the Assembly, p.481-87; congratulatory address to Governor Clinton in behalf of citizens of Utica, also his reply, which vindicates him from the charge of claiming the whole merit of originator of scheme, p.497-99; letter of Benjamin Wright relative to labors of himself and of Canvass White connected with the canal policy from 1791 to 1823, p.500-4.  
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- Hawley, Marwin S. The Erie canal; its origin considered in reference to Gouverneur Morris, Joshua Forman, James Geddes and Jesse Hawley. (*see* Buffalo historical society. Publications. 1880. 2:335-49) 974.797 B86  
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- Clinton's memorial; planning, building and opening. (*see* Hulbert, A. B. The great American canals. 1904. v.2, p.62-151) 917.3 H871
- Early promoters and their dreams. (*see* Hulbert, A. B. The great American canals, 1904, v.2, p.43-61) 917.3 H871

## Construction and Enlargements.

## Main canal.

*See also* Material relating to history and construction of more than one canal, Ship canals, Management, Contracts, Claims, Finances and other related headings.

Huntington, George. Letter to Albert Gallatin, dated Rome Dec. 29, 1807. (*see* Amer. state papers. Miscellaneous, 1:776-77)

Schultze, Christian. Advantages of the canal route. (*see* his Travels on an inland voyage 1810. 2:10-15) 917.3 Sch8  
Written in 1807.

An act authorizing an appropriation to commissioners for exploring the route between the Hudson and Lake Erie, Apr. 5 1810. (*see* Laws of New York)

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Most important portion of book is the Private canal journey, 1810, from Schenectady to Buffalo, p.27-204.

Helpful data in regard to wages, prices, value of land and local products.

N. Y. (state)—Senate and Assembly. Resolutions and act relative to inland navigation between Hudson's river and Lake Erie and Lake Ontario, 1810. (*see* Ass. jour. 1810, 33:254-55)  
Also in *Laws in relation to the Erie and Champlain canals* to 1825, 1:46-47 (386 qN42).

N. Y. (state)—Governor. Message. (*see* Ass. jour. 1811, 34:7)

Notice and favorable mention of report of commissioners to examine practicability and probable cost of canal between Hudson and Lake Erie.

Communications relative to the application to the Congress of the United States for their co-operation and aid in making a canal navigation between the Great Lakes and the Hudson river, Dec. 23, 1811 to Feb. 20, 1812. (*see* American state papers. Miscellaneous, 2:165-66 and 179, Docs. 303, 304 and 313)

Communication of commissioners to the House of representatives, Dec. 23, 1811 (120 words); communication of President to Congress; and act of New York state passed Apr. 8, 1811 (200 words); report of committee, Feb. 20, 1812 (70 words).

The grand canal. (*see* Niles' register, 1812, 2:46-47) 700 words.

305 qN59

Extract from pamphlet entered under Hugh Williamson.

Ohio—Legislature. Resolution that the expense of a canal from the Hudson river to the Great Lakes ought to be provided for by Congress, Jan. 17, 1812. (*see* Amer. state papers. Miscellaneous, 2:178)

N. Y. state law lib.

U. S. —Canal Companies, House committee on. Report on memorials relative to a canal from the Great Lakes to the Hudson River, Feb. 20, 1812. Sp.O. Wash. 1812. 040 P1 v.2  
Public finances forbid investing in improvement of canals.

Williamson, Hugh. Remarks on the contemplated grand canal between Lake Erie and the Hudson river. 31p. O. n.p. 1812

386

Contains also an address by Atticus (DeWitt Clinton) to the citizens of the state of New York.

Morris, Gouverneur and Robert Fulton. The advantages of the proposed canal from Lake Erie to Hudson's river, 1814; correspondence, (*see* Niles' register, May 14, 1814, 6:169-72) 4000 words.

305 qN59

Also in volume of pamphlets (040 P v.145).

Captain Ellicott's opinion of the portion of the canal route between Genesee river and Lake Erie. (*see* Niles register, 1816, 11:108) 75 words.

305 qN59

Clinton, De Witt. Remarks on the proposed canal from Lake Erie to the Hudson. 14p. O. N. Y. 1816.

386

Signed "Atticus."

N. Y. (state)—Canal commissioners. Copy of a letter to the Governor of Ohio soliciting co-operation in the construction of the Erie canal, Nov. 11, 1816, with reply. (*see* Haines, C. G. comp. Public documents. 1821. p.197-202)

386 H12

Also in *Laws in relation to the Erie and Champlain canals* to 1825, p.297-301 (386 qN42); and Official reports, 1817, p.62-64 (626 H7a); also (626 H7).

New York citizens. Memorial in favor of a canal navigation between the great western lakes and the tide-waters of the Hudson Feb. 21, 1816. (*see* N. Y. (state)—Canals, Committee on. Laws in relation to the Erie and Champlain canals, 1825. 1:122-41) 5400 words.

305 qN59

Also in *David Hosack's Memoir of DeWitt Clinton*, p.406-21 (923.27 qC61); in volume of pamphlets in New York state library (040 P1 v.9); *Niles' register*, supplement, 1815-16, 9:145-49 (305 qN59); *Public documents* compiled by C. G. Haines in 1821, p.77-100 (386 H12).

One of the most influential means of bringing about the system of internal navigation which it recommended.

Petitions presented in relation to the Erie canal, etc. Feb. 21-Apr. 3, 1816. (*see* N. Y. (state)—Canals, Committee on. Laws in relation to the Erie and Champlain canals. 1825. 1:119-22)

386 qN42

Remarks on the proposed canal from Rome to Onondaga lake. 6p. O. N. Y. 1816

386

In a letter from a gentleman at Rome who surveyed and took the levels of the country from Rome to Cayuga lake, by order of the commissioners.

A serious appeal to the wisdom and patriotism of the Legislature of New York on the subject of a canal communication between the great western lakes and the tide-waters of the Hudson. 37p. O. n. p. 1816. 308 P36

By a friend to his country.

Also in volume of pamphlets (040 P1 v.9).

Advantages of the canal to the commerce and general welfare of the state.

Account of celebration at Utica, July 4, 1817, on the occasion of commencing the excavation of the Erie canal, with address by J. Hathaway. (see Niles' register, July 26, 1817, 12:340) 500 words. 305 qN59

Evidently an error; celebration was held at Rome.

N. Y. (state)—Canal commissioners. Copy of letter to Paul Busti, agent of the Holland land company, with answer, 1817. (see their Official reports, 1817, p.70-72) 626 H7a

Also in *Annual reports*, v.1 (626 H7); *Public documents* compiled by C. G. Haines in 1821, p.209-13 (386 H12); and *Laws in relation to the Erie and Champlain canals*, to 1825, 1:308-11 (386 qN42).

Report on western canal, transmitted Feb. 17, 1817. (see Ass. jour. 1817, 40:313-55) Also in *Annual reports*, 1817, appendix (626 H7); *Official reports*, p.1-53 (626 H7a); *Public documents* compiled by C. G. Haines in 1821, p.103-85 (386 H12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1:196-272 (386 qN42).

Report relative to the Western inland lock navigation company, Apr. 3, 1817. (see Ass. jour. 1817. 40:734-35)

Also in *Public documents* compiled by C. G. Haines in 1821, p.259-62 386 H12); and *Laws in relation to the Erie and Champlain canals*, to 1825, 1:331-34 (386 qN42).

Van Rensselaer, J. Rutson. Proposition for the construction and completion of the western canal. (see Ass. jour. 1817, 40:631-32)

Western canal. (see Alb. argus, July 18, 1817) 1000 words. 071 xA1

Editorial; historical topographical review of the proposed canal.

Editorial on the prospective inland communication. (see Niles' register, 1818, 3:161) 350 words. 305 qN59

Grand canal. (see Niles' register, Oct. 24, 1818, 15:135) 700 words. 305 qN59

Explanation of the plan for the canal, written at Onondaga, Sept. 9.

The canal. (see Alb. argus, May 25, 1819) 500 words. 071 xA1

From *National advocate*.

Political critique, Governor Clinton's relation to the Erie canal.

First experiment in navigating a part of the grand western canal. Oct. 23, 1819. (see Niles' register, 1819, 17:160, 177-78) 900 words. 305 qN59

Includes speech of DeWitt Clinton at Utica and an extract from a letter of an acting canal commissioner to the president of the board.

Mr. Clinton and the grand canal. (see Alb. argus, Nov. 26, 1819) 3200 words. 071 xA1

By "Crasus."

Offer of a company to build the great canal for a fifty year lease of the salt springs belonging to the state. (see Niles' register, 1819, 16:112) 90 words. 305 qN59

The canal. (see Alb. daily advertiser, Apr. 1, 1820) 1000 words. N. Y. state lib.

Critical communication.

(see Alb. gazette and daily advertiser).

Aug. 25, 1820. 1400 words.

Sept. 19, 1820. 1400 words.

Critical communications.

N. Y. state lib.

(see Alb. gazette and daily advertiser, Nov. 27, 1820). 900 words. N. Y. state lib.

Suggestions as to route.

Clinton, De Witt. Letters on the canal policy. (see Alb. gazette and daily advertiser)

Letter . 1 and 2

June 5, 1820

3200 words.

" 3

" 8,

1600

" 4

" 10, "

2000

" 5

" 12, "

2000

" 6

" 14, "

2000

" 7 and 8

" 15, "

3000

" 9

" 19, "

2000

" 10

" 21, "

1600

" 11

" 26, "

1700

" 12

" 29, "

1600

" 13

July 3, 10 and 12, 1820

4500

From *New York statesman*.

Signed "Tacitus."

Replies by Elkanah Watson.



Mills, Robert. Description of the opening of the Erie canal, 1819, and advantages gained. (see his *Treatise on inland navigation*, 1820, p.63-66). 386 M62

Watson, Elkanah. Reply to letters of Tacitus. (see Alb. gazette and daily advertiser. N. Y. state lib.

June 7 and 8, 1820	3200 words.
13	3200
Aug. 18	2800
24	2200
29	3000

From *New York statesman*.

Erie canal. (see Alb. daily advertiser, June 27, 1821) 4000 words. N. Y. state lib.  
Communication from Stephen Van Rensselaer with accompanying letters, etc.

— (see Alb. daily advertiser, July 10, 1821) 500 words. N. Y. state lib.  
Communication favoring direct route to Schenectady from Hudson river.

— (see Alb. daily advertiser, Oct. 8, 1821) 700 words. N. Y. state lib.  
Concerning its route.

The great Erie canal. (see Alb. daily advertiser, Dec. 15, 1821) 1300 words. N.Y. state lib.  
From *Poughkeepsie journal*. Description of route.

N. Y. (state)—Canal fund, Commissioners of. Communication on the petition of the Western inland lock navigation company. (see *Ass. Jour.* 1821, 44:262-64)

Progress of the canal. (see Alb. daily advertiser, July 2, 1821) 1500 words. N. Y. state lib.  
Communication to *New York Columbian*.

— (see Alb. daily advertiser Nov. 16, 1821) 500 words. N. Y. state lib.  
From *Utica gazette*.  
Ceremony at opening of the canal from Utica to Little Falls.

The Western canal. (see Alb. daily advertiser, Aug. 13, 1821) 1600 words. N. Y. state lib.  
Communication to *New Haven herald*.  
Review and criticism of plan.

Canal. (see Alb. daily advertiser, Mar. 23, 1822) 600 words. N. Y. state lib.  
Critical communication.

Erie canal, Criticism of (see Alb. daily advertiser, Feb. 27 and Mar. 9, 1822) 800 and 500 words. N. Y. state lib.

Examination of the line of the great Erie canal from Schoharie creek to the Hudson river, and contrasting it with a more direct line. 32p. O. n.p. 1822 040 P v.145

Geological survey. (see Alb. daily advertiser, Dec. 11, 1822) 400 words. N. Y. state lib.  
Editorial on progress made with survey of Erie canal route.

Randel, John, jr. Description of a direct route for the Erie canal at its eastern termination; with estimates of its expense and comparative advantages. 73p. O. Alb. 1822. 626.1 I2  
Republished in pamphlet in 1836, 50p. (040 P1 v.25).

Travel and traffic on the portion of the Erie canal already in use. (see Niles' register, June 29, 1822, 22:275-76) 500 words. 305 qN59

An act respecting the Erie canal, passed Apr. 22, 1823. (see *Laws of New York*)  
Also *Ass. doc.* 1823, no. 159.

Additional celebration. (see Alb. daily advertiser, Oct. 13, 1823) 700 words. N. Y. state lib.  
Toasts given by Dr. Hosack, Benjamin Wright, C. D. Colden and others.

Aqueduct—Rochester. (see Alb. daily advertiser, Oct. 23, 1823) 800 words. N. Y. state lib.

From *Rochester telegraph*.  
Description and use.

Canal celebration. (see Alb. daily advertiser, Sept. 30, 1823) 300 words. N. Y. state lib.  
Report of meeting of committee on arrangement.

— (see Alb. daily advertiser, Oct. 10, 1823) 8500 words. N. Y. state lib.  
Report of speeches, toasts, etc., made during the ceremonies.

— (see Alb. daily advertiser, Oct. 13, 1823) 1600 words. N. Y. state lib.  
Report of ceremonies at New York city at New York coffee house banquet.

Clinton, De Witt. Grand canal of New York. (see Niles' register, Nov. 29, 1823, 25:199) 350 words. 305 qN59

Copy of a letter to James Riley, Ohio. A summary of some particulars about the canals.

- New York canal. (see Alb. daily advertiser, Nov. 13, 1823) 700 words.  
N. Y. state lib.
- From *Cincinnati republican*.  
Letter describing the canal and the boats used thereon.
- Eaton, Amos. To gentlemen residing in vicinity of Erie canal. (see Alb. daily advertiser, May 15, 1823) 1100 words.  
N. Y. state lib.
- Concerning probable location of coal along route.
- A few interesting facts. (see Niles' register, 1823, 25:128) 300 words. 305 qN59  
Cost of canal a mile, of locks, of boats, of travel, etc.
- Harper, Gen. Robert Goodloe. Comparison of Erie canal with projected Ohio canal. (see *his* Speech to the citizens of Baltimore. 1823, p.29-31) 386 Sh8
- Moulton, Joseph W. Remonstrance and memorial to the Legislature relative to the Western termination of the grand canal; containing an exposition of the merits of the question in controversy between Gen. P. B. Porter and his associates and the village of Buffalo. 19p. O. Alb. 1823. 386
- N. Y. (state)—Canals, Committee on. Report on petitions relative to the Erie canal at Rome. 1p. (Ass. doc. 1823, no. 158)
- The Ohio canal. Sp. O. n.p. 1823. 386  
Signed "The voice of New York."  
Bound with *Remarks on the proposed canal from Lake Erie to the Hudson river* by "Atticus."
- Reminiscences. (see Alb. daily advertiser, Oct. 2-25, 1823) N. Y. state lib.  
Signed "Investigator."
- No. 1. Concerning celebration of passage of first boat through terminating lock of canal, 600 words.  
No. 2. Critical examination of speech, made in Senate against the canal by Senator from Dutchess county, 700 words.  
No. 3. Concerning opposition of *National advocate* to the canal, 800 words.  
No. 4. Concerning attacks of "*National advocate*" on De Witt Clinton, 500 words.  
No. 5. Relations of DeWitt Clinton and Gouverneur Morris to canal, 600 words.  
No. 6. Unjustifiable criticism of management of canal affairs by canal commissioners, 1200 words.  
No. 7. An early idea of the canal, 500 words.  
No. 8. Defends DeWitt Clinton against criticisms of *National advocate*, 900 words.  
No. 9. Defends DeWitt Clinton's canal policy, 1600 words.  
No. 10. DeWitt Clinton, relative to completion of canal, 1200 words.
- The canal. (see Alb. daily advertiser, May 31, 1824) 300 words. N. Y. state lib.  
From *Lockport observatory*.  
State of construction of canal and locks at Lockport.
- Eaton, A. Geological and agricultural survey of the district adjoining the Erie canal. O. Alb. 1824. 557.47 14  
Pt. 1. Rock formation and geological profile.
- N. Y. (state)—Canal commissioner, acting. Report relative to the aqueduct across Genesee river. 6p. (Ass. doc. 1824, no. 94; or, Ass. jour. 1824, 47:515-19)  
Description, labor performed, amount expended, etc.
- N. Y. (state)—Canals, Committee on. Report in relation to the Erie canal. 3p. (Ass. doc. 1824, no. 166)  
Documents accompanying report, 30p. Ass. doc. 1824, no. 167.
- N. Y. (state)—Select committee. Report relative to the report of the acting canal commissioner in charge of constructing the canal across the Genesee river. 5p. (Ass. doc. 1824, no. 193)
- Canal celebration. (see Alb. daily advertiser, Oct. 1, 3 and 24, 1825) 1600, 700 and 500 words. N. Y. state lib.
- Canal celebration at Syracuse. (see Alb. daily advertiser, Nov. 11, 1825) 2000 words.  
N. Y. state lib.
- Celebration, completion of the Erie canal. (see Alb. daily advertiser, Nov. 1, 1825) 3800 words. N. Y. state lib.  
From *Buffalo journal, extra*.
- Colden, Cadwallader David. Memoir prepared at request of a committee of the common council of the city of New York and presented to the mayor at the celebration of the completion of the New York canals. p.1-102, illus. map, Q. N. Y. 1825. 386 qC67  
Gives a history of the construction of the Erie canal and a description of the celebration.

- Grand canal celebration. (see Alb. daily advertiser, Nov. 1, 1825) 1500 words.  
N. Y. state lib.
- From *Rochester telegraph*.
- Grand canal celebration by the city of Albany. (see Alb. daily advertiser, Oct. 27, 1825) 1200 words.  
N. Y. state lib.
- Grand celebration of the city of New York. (see Alb. daily advertiser, Oct. 26, 1825) 4300 words.  
N. Y. state lib.
- Mitchill, Samuel L. Address, after mingling waters from various bottles derived from various European waters, significant of their connection with our states by navigation and commerce. (see Colden, C. D: Memoir of the completion of the New York canals, 1825. Appendix, p.273-79) 386 qC67
- N. Y. (state)—Canal commissioners. Report concerning proposed canal from Erie canal to the point where the canal from Buffalo connects with Niagara river. (Ass. jour. 1825, 48:525-26; or, Ass. doc. 1825, no. 113)
- N. Y. (city)—Common council. An account of the commemoration of the completion of the Erie canal by the corporation of the city of New York, together with a statement of the arrangements made by the merchants, citizens, and societies to unite in the celebration; with detailed reports from the committees. Also special addresses, maps, prints, lithographic engravings . . . concluded by a statement of the distribution of the medals and other tributes of respect, 1826. (see Colden, C. D: Memoir of the completion of the New York canals, 1825, p.107-406) 386 qC67
- State jubilee. (see Alb. daily advertiser, Nov. 4, 1825) 16000 words, N. Y. state lib.
- Stone, William L. Narrative of the festivities observed in honor of the completion of the grand Erie canal, begun at Buffalo, Oct. 26, 1825 and ended in the city of New York, Nov. 4, 1825. (see Colden, C. D: Memoir of the completion of the New York canals. 1825. Appendix, p.291-331) 386 qC67
- Erie canal medals. (see Niles' register, 1826, 30:314) 500 words. 305 qN59
- N. Y. (state)—Canals, Committee on. Report on petition of executors of Dominick Lynch for damages due to abandonment of canal between Mohawk river and Wood creek, constructed by the Western inland lock navigation company. (Sen. jour. 1826, 49:429-30)
- Van Rensselaer, Gen. Stephen. Letter with answers to the queries about the Erie canal, in reply to a letter from Gen. H. A. S. Dearborn of Mass. 1825. (see Mass.—Canal route commissioners. Report. 1826. p.37-40) 386 M38
- N. Y. (state)—Canal commissioners. Report on petition of inhabitants of Rome claiming damage through abandonment of old canal at that place. (see Ass. jour. 1827, 50:892-93)
- Extract about the Erie canal from a proposed history of New York. (see Niles' register, 1828, 35:115) 350 words. 305 qN59
- Signed "Macaulay."
- N. Y. (state)—Canal commissioners. Report in obedience to the resolution of Feb. 17, on a bill authorizing the construction of an aqueduct over Mohawk river at or near Amsterdam. (Sen. jour. 1829, 52:270-71, 348-49)
- N. Y. (state)—Canal board. Report in answer to resolution of the Senate relative to Erie canal between Schenectady and Albany. 3p. (Sen. doc. 1834, no. 72)
- N. Y. (state)—Canal commissioners. Report in relation to a tunnel under the Erie canal and other works of the Cohoes company, and bill for their relief. 2p. (Sen. doc. 1834, no. 95)
- Report on petition of Cohoes company. 11p. (Ass. doc. 1834, no. 227)
- Report relative to rebuilding aqueduct at Rochester. 26p. (Ass. doc. 1834, no. 88)
- Sloop canal from the Hudson to the lakes. (see Amer. R. R. jour. 1834, 3:257) 200 words. 620.5 qJ2
- Editorial notice of bill providing for survey of route from Albany to Oswego to admit vessels of two hundred tons burden.
- An appeal to the citizens of Oneida county, on the enlargement of the Erie canal. (see Amer. R. R. jour. 1835, 4:290-92) 4200 words. 620.5 qJ2
- From the *Utica observer*.  
By a fellow citizen.
- Enlargement of the canal. (see Alb. daily advertiser, Oct. 16, 1835) 500 words.  
N. Y. state lib.
- Meeting of citizens at Lockport to encourage the project.

- Erie canal. (see Amer. R. R. jour. 1835, 4:726) 300 words. 620.5 qJ2  
From the *Rochester democrat*.  
Suggests rectifying route.
- Erie canal meeting. (see Alb. daily advertiser, Sept. 26, 1835) 1600 words. N. Y. state lib.
- Memorial and resolutions from inhabitants of Utica concerning the enlargement of the canal.
- N. Y. (state)—Assembly. Resolution offered by Mr. Thorn, relative to enlargement of Erie canal. 1p. (Ass. doc. 1835, no. 340)
- N. Y. (city)—Assistant aldermen, Board of. Resolutions respecting the enlargement of the Erie canal and in favor of aid from the state to the New York and Erie railroad. (see Amer. R. R. jour. 1835, 4:338) 800 words. 620.5 qJ2
- N. Y. (state)—Canal commissioners. Report relative to improvement of Erie canal. 72p. (Ass. doc. 1835, no. 143)
- N. Y. (state)—Canals, Committee on. Report relative to improvement of Erie canal. 23p. (Ass. doc. 1835, no. 254)
- Rochester, citizens of. Report of meeting, Sept. 21, 1835, and memorial to the canal board of the state of New York. (see Amer. R. R. jour. 1835, 4:335) 600 words. 620.5 qJ2
- Appeal to the representatives of the people of New York in relation to the proposed enlargement of the Erie canal. 16p. O. n.p. 1836. 040 P v.24 or 145  
Signed "Oswego." Disapproves plan of enlarging Erie canal and proposes opening a new route by way of Lake Ontario.
- Campbell, Allan. Report on a direct route for the eastern termination of the Erie canal, with estimates of its expense, and the comparative expense of the proposed enlargement of the present line. 36p. O. Alb. 1836. 040 P v.223  
Also in *Alb. daily argus*, Mar. 31, 1836, 2400 words (071 All).  
Description of the line traversed by the direct route showing that there will be a sufficient supply of water, and giving estimate of cost of enlargement of Erie canal from Fultonville to Albany.
- Direct canal from Albany to Schenectady. (see Alb. argus, Jan. 12, 1836) 400 words. 071 xAll
- Report of public meeting called to advocate the straightening of the Erie canal.
- Documents accompanying the report of the canal board on the enlargement of the Erie canal. 291p. (Ass. doc. 1836, no. 99)  
Contents: Report and estimate from Albany to Fultonville, by J. B. Jarvis; report from Fultonville to Frankfort, by N. S. Roberts; reports from Frankfort to Lyons, by F. C. Mills; report from Lyons to Buffalo, by Holmes Hutchinson; report in relation to size of canal, by J. B. Jarvis and F. C. Mills; report in relation to the location and construction of the Rochester aqueduct, by N. S. Roberts and J. B. Jarvis.
- Enlargement of the Erie canal. (see Alb. daily argus, Jan. 22, 1836) 1200 words. 071 xAll
- Communicated. Argument favoring selection of "lake route."
- Equal rights, *pseud.* Review of the pamphlet of "Oswego" against the intended enlargement of the Erie canal. 21p. O. Buffalo, 1836. 386 Oa9
- Erie canal. (see Alb. argus, Jan. 12, 1836) 400 words. 071 xAll  
From *Onondaga standard*.  
Editorial on the circuitous route of the canal between Albany and Schenectady.
- Erie canal—direct route. (see Alb. daily argus, Feb. 24, 1836) 300 words. 071 xAll  
From *New York commercial advertiser*: Editorial criticising proposed route.
- Erie canal enlargement. (see Amer. R. R. jour. 1836, 5:38-39, 402-4, 452, 578, 673-74) 5500 words. 620.5 qJ2  
Two references from the *New York times*.  
Signatures used are: "Oswego," "Truth," "O," "J. E. B." and "S."  
—— Editorial. (see Alb. daily argus, Nov. 1, 1836) 2000 words. 071 xAll
- Harlem, *pseud.* Erie canal enlargement. (see Amer. R. R. jour. 1836, 5:161-62) 1500 words. 620.5 qJ2
- Need of change of route of canal.
- N. Y. (state)—Canal board. Report in relation to enlargement of Erie canal. 15p. (Ass. doc. 1836, no. 98)  
Documents accompanying said report, 291p. (Ass. doc. 1836, no. 99)
- N. Y. (state)—Canals, Committee on. Report on memorial and resolutions of common council for direct route for eastern termination of Erie canal, and remonstrances from Troy and Schenectady. 7p. (Sen. doc. 1836, no. 99)

Schenectady, Citizens of. Remonstrance adopted by the inhabitants of Schenectada at a meeting held Feb. 25, 1836, against the change of the route of the Erie canal proposed by the common council of Albany. 16p. O. Schenectada, 1836. 040 P1 v.26

Troy—Common council. Report remonstrating against the direct route for the eastern termination of the Erie canal, and an answer to the report of Allan Campbell, civil engineer, made by the authority and under the direction of the common council of Albany. 36p. O. Troy, 1836. 040 P v.1947

The enlarged canal—Lockport. (see Alb. daily argus, Aug. 5, 1837) 400 words.

071 xAll

From Lockport balance. Editorial.

The enlargement of the Erie canal. (see Alb. daily argus, Jan. 13, 1837). 1400 words.

071 xAll

From Rochester democrat. Report of mass meeting of citizens.

— (see Amer. R. R. jour. 1837, 6:241) 450 words.

620.5 qJ2

From Detroit journal and courier.

Erie canal enlargement. (see Niles' register, 1837, 51:304) 200 words.

305 qN59

For leading off the canal from between Fort Hunter creek and Schenectady to intersect the Hudson below the sand bars and islands.

Extension of the Erie canal. (see Amer. R. R. jour. 1837, 6:114)

620.5 qJ2

From the Van Buren times.

Erie canal should be extended to some point farther up the lake that its commerce may begin earlier in the spring.

Memorial of inhabitants of Oneida county against enlargement of Erie canal and for a canal from Oswego to Utica. 9p. (Ass. doc. 1837, no. 132)

N. Y. (state)—Canal board. Report on enlargement of Erie canal. 6p. (Sen. doc. 1837, no. 53)

Proceedings of the convention, upon the subject of an immediate enlargement of the Erie canal; held in Rochester, Jan. 1837. 28p. O. Buffalo, 1837.

Canal policy of the state—walling the Erie canal. (see Alb. daily argus, May 2, 1838) 700 words.

071 xAll

Commendatory communication.

N. Y. (state)—Canal commissioners. Report on petition of inhabitants of Oriskany for facts relative to construction of Erie canal at that place. 3p. (Ass. doc. 1838, no. 225)

— Report relative to Erie canal enlargement. 11p. (Ass. doc. 1838, no. 251)

— Report on resolution of Assembly relative to expediency of altering plans for construction of enlarged Erie canal near Albany. 16p. (Ass. doc. 1838, no. 313)

N. Y. (state)—Canals, Committee on. Report on memorial of citizens of West Troy relative to level of canal at that place. 9p. (Ass. doc. 1838, no. 333)

— Report relative to the enlargement of the Erie canal. 8p. (Ass. doc. 1838, no. 245)

O'Reilly, Henry anon. Internal improvements; the canal policy of the state of New York. 2p. F. bound O. Rochester, 1838. 040 P v.223

Securing and quickening the navigation on the enlarged canal. (see Alb. daily argus, May 24, 1838) 600 words.

071 xAll

Signed "Rochester." Advocates walling the canal.

The enlargement of the Erie canal. (see Alb. evening jour. Apr. 5, 1839) 1300 words.

N. Y. state lib.

Also in Alb. daily argus, Apr. 8, 1839 (071 xAll).

Report of public meeting of citizens of Lockport.

— (see Alb. daily argus, May 4, 1839) 700 words.

071 xAll

Writer suggests economical plans of enlargement—raising banks of canal, etc.

— Editorial. (see Alb. daily argus, Feb. 18, 1839) 400 words.

071 xAll

— (see Alb. daily argus, Feb. 19, 1839) 1000 words.

071 xAll

Criticising an article in Evening journal.

— (see Alb. daily argus, Mar. 15, 1839) 800 words.

071 xAll

Enlargement of the Erie canal—six feet by sixty. (see Alb. daily argus, May 3, 1839) 2800 words.

071 xAll

Volume of business done does not require enlargement to exceed above dimensions.

- The Erie canal. (see The Penny mag. 1839, 8:262) 052 qP38
- Erie canal enlargement. (see Alb. evening jour. May 24, 1839) 1500 words. N. Y. state lib.
- Substance of speech of Mr. Verplanck, advocating a reduction of the proposed dimensions.
- Editorial. (see Alb. daily argus, Feb. 26, 1839) 700 words. 071 xAll
- (see Alb. daily argus, Apr. 26, 1839) 600 words. 071 xAll
- Favors a reduction of the size proposed.
- (see Alb. daily argus, May 6, 1839) 1500 words. 071 xAll
- Advocates the size, six feet by sixty.
- (see Alb. evening jour. Oct. 15, 1839) 700 words. N. Y. state lib.
- Erie canal enlargement and the authors of a debt for that purpose. (see Alb. daily argus, Oct. 3, 1839) 4000 words. 071 xAll
- Historical review of the project. Editorial.
- Erie canal enlargement unnecessary. (see Amer. R. R. jour. 1839, 9:225-27) 600 words. 620.5 J2
- Signed "Ontario."
- Erie canal incendiaries. (see Alb. evening jour. May 14, 1839) 800 words. N. Y. state lib.
- Editorial concerning canal breaches maliciously caused.
- The "more immediate" enlargement of the Erie canal. (see Alb. daily argus, Apr. 29, 1839) 1300 words. 071 xAll
- Consideration of cost. Editorial.
- The "more speedy" enlargement. (see Alb. daily argus, Mar. 25, 1839) 1600 words. 071 xAll
- Editorial reviewing legislative action on the proposed enlargement.
- N. Y. (state)—Assembly. Resolutions requiring canal commissioners to report in relation to enlargement of Erie canal. 2p. (Ass. doc. 1839, no. 224)
- N. Y. (state)—Canal board. Report on petitions from inhabitants of Oneida, Madison, and Onondaga counties, relative to enlargement of Erie canal. 3p. (Ass. doc. 1839, no. 369)
- N. Y. (state)—Canal commissioners. Report concerning location of the lines of the Erie canal through Rochester. 6p. (Ass. doc. 1839, no. 287)
- Report on remonstrance of inhabitants of Oriskany against change of route of Erie canal. 1p. (Ass. doc. 1839, no. 261)
- Report relative to construction of enlarged Erie canal independent of Niagara river and the effect of a dam at Black Rock. 16p. (Sen. doc. 1839, no. 54)
- Report relative to expediency of walling with stone the sides of Erie canal. 3p. (Ass. doc. 1839, no. 238)
- N. Y. (state)—Canals, Committee on. Report on petition for a side-cut from Erie canal to Hudson river near Lansingburgh. 2p. (Ass. doc. 1839, no. 188)
- O'Reilly, Henry. The canal policy of the state of New York. (see Alb. daily argus, Jan. 19, 1839) 2100 words. 071 xAll
- Advocates walling the Erie canal to secure and quicken navigation on it.
- Proceedings of meetings of the citizens of Rochester, Buffalo, Lockport and Palmyra, expressive of the views of the people of western New York with reference to the improvement of the Erie canal. 8p. O. Rochester, 1839. 040 P v.1947
- Six feet and sixty. (see Alb. daily argus, Apr. 27, 1839) 700 words. 071 xAll
- Editorial advocating above dimensions for enlarged Erie canal.
- The Erie canal enlargement. (see Alb. daily argus, Mar. 3, 1840) 3200 words. 071 xAll
- Sketch of debate in Assembly on the bill for the opening of the navigation on the canal.
- (see Amer. R. R. jour. 1840, 10:158-59) 225 words. 620.5 J2
- Editorial from *Journal of commerce* on articles signed "Fulton."
- (see Niles' register, May 16, 1840, 58:165) 650 words. 305 qN59
- From *Baltimore American*.
- Editorial on report of canal board in answer to resolutions of the Assembly.
- Fulton, pseud. Internal improvements of New York. (see Amer. R. R. jour. 1840, 10:41-45, 67-70, 104-9, 133-38) 5400 words. 620.5 J2
- Against enlargement beyond adding twelve or eighteen inches to the banks.

Hawley Jesse. An essay on the enlargement of the Erie canal with arguments in favor of retaining the present proposed size of 70 feet by 7, and for its entire length from Albany to Buffalo. 16p. O. Lockport, 1840. 040 P v.223

N. Y. (state)—Assembly. Resolution in relation to the Erie canal enlargement. 1p. (Ass. doc. 1840, no. 204)

An act authorizing a lateral canal in the village of Syracuse, passed May 10, 1841. (see Laws of New York)

Examination of the report of the canal board of New York, respecting the enlargement of the Erie canal, etc. made Apr. 11, 1840. (see Amer. R. R. jour. 1841, 12:41-52) 3300 words. 620.5 J2

Signed "F."

The West vindicated; a review of the address of Gen. James Tallmadge before the American Institute, 1841. 24p. O. Buffalo, 1842. 040 P v.565

Signed "By a western New Yorker."

The Erie canal; its capacity, lockages, iron boats. (see Amer. R. R. jour. 1843, 16:364-67) 1100 words. 620.5 J2

Signed "J. E. B." Remarks against the enlargement of 1836. Opposed to further enlargement for some time.

N. Y. (state)—Canals, Committee on. Report on petition of inhabitants of Root, Montgomery county, relative to enlargement of Erie canal. 9p. (Sen. doc. 1843, no. 102)

Minority report, 6p. (Sen. doc. 1843, no. 103).

Brodhead, Edward H. Report of the resident engineer at Rome in relation to the enlarged Erie canal at that place, together with the expenses of preparing the old and new lines. 8p. (Sen. doc. 1844, no. 110)

N. Y. (state)—Canal commissioners. Report in relation to the Jordan level of the Erie canal. 7p. (Sen. doc. 1844, no. 129)

N. Y. (state)—Canals, Committee on. Report on petition to bring into use new canal line through Rome. 3p. (Ass. doc. 1844, no. 125)

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N. Y. (state)—Senate. Resolution favoring repairs on Erie canal enlargement. 1p. (Sen. doc. 1844, no. 108)

Enlargement of the Erie canal and completion of other unfinished works, 1845. (see Fisher's national mag. 1845 1:365-69) 1600 words. 305 F53

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From *Hunt's merchant magazine*.

History of enlargement. Favors use of surplus revenue for its completion.

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Report on proposals for work on sections 51-57, Erie canal, etc. 40p. (Ass. doc. 1845, no. 101)

Report on the amount of new work on the enlarged Erie canal brought into use since 1842, cost of the same and the circumstances attending the adoption of such work. 15p. (Ass. doc. 1845, no. 225)

Report on obstructions to navigation east of Port Byron. 3p. (Ass. doc. 1846, no. 52)

Report on draining Jordan level of old Erie canal. 4p. (Ass. doc. 1847, no. 149)

Rochester, Citizens of. Proceedings of meeting in Rochester to memorialize Legislature for speedy enlargement of Erie canal. 11p. (Ass. doc. 1847, no. 183)

Erie canal enlargement. (see Amer. R. R. jour. 1848, 21: 97) 250 words. 620.5 qJ2

Work going on rapidly west of Utica.

N. Y. (state)—Canal board. Report on the memorials for the enlargement of the Erie canal and basins connected therewith at Buffalo. 15p. (Ass. doc. 1848, no. 130)

Report on canal nuisance at Spencerport. 2p. (Ass. doc. 1850, no. 139)

Report on route of Erie canal through village of Geddes. 1p. (Ass. doc. 1850 no. 103)

N. Y. (state)—Canals, Committee on. Report on memorial of salt manufacturers on route of Erie canal through village of Geddes. 4p. (Ass. doc. 1850, no. 135)

Beach, Nelson J. Report of a late canal commissioner on necessity of Erie canal enlargement. 9p. (Ass. doc. 1851, no. 63)

Also in *American railroad journal*, 1851, 24:132-34 (620.5 qJ2).  
Aims to show the time necessary to complete the enlargement and the difficulties existing in the meantime.

Enlargement of the Erie canal. (see Amer. R. R. jour. 1851, 24:148-49, 164-65) 5000 words.  
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Erie canal. (see Amer. R. R. jour. 1851, 24:259-62) 620.5 qJ2  
Extract from *Annual report* of State Engineer with comment.

N. Y. (state)—Canal board. Report on Erie canal enlargement. 13p. (Sen. doc. 1851, no. 88)

N. Y. (state)—Engineer and Surveyor. Report concerning the lengthening of Erie canal locks. 8p. (Ass. doc. 1851, no. 67)

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Prospective benefit of enlargement of the canal.

N. Y. (state)—Canal commissioners. Report relative to the improvement of the Erie canal. 72p. Q. (Ass. doc. 1853, no. 143) 626  
Accompanied by report of Holmes Hutchinson, engineer.

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N. Y. (state)—Engineer and Surveyor. Report on canal aqueduct over Boorman's creek. 3p. (Sen. doc. 1854, no. 61)

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N. Y. (state)—Canal Department, Auditor of. Report on line of enlargement of Erie canal through village of Port Byron. 3p. (Ass. doc. 1855, no. 74)

N. Y. (state)—Canals, Committee on. Report on proposed change in line of Erie canal enlargement near Port Byron. 2p. (Ass. doc. 1855, no. 132)

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 Shows difficulties in way of improving Erie canal; competition with Canadian canals cannot be greatly increased.
- Jervis, John Bloomfield. Letter Sept. 4, 1867, opposing the costly enlargement proposition without thorough investigations. (see Tilden, S: J. Writings and speeches. 1:390-93) 306 T45  
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 Views upon the subject of cheapening transportation between the great West and the seaboard. General government should furnish means for necessary improvements.
- Canal enlargement. (see Buffalo board of trade. Statement of trade and commerce for 1873. p.107-8) 750 words. 381 B86
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Contents: Protect the canals, from *New York herald*, Feb. 18, 1889.  
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- James, Edmund J. Canal and the railway. (*see* Amer. econ. assoc. 1890, 5:281-324) 330.6 Am3
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- Extract from an interview with Lieutenant-Governor, T. G. Alvord, Feb. 1897. p.14-16, T. 386  
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Opposes the Parshall bill.

- Difficult excavating on the Jordan level, 1898. (*see* Eng. rec. 1898, 38:266) 175 words. 620.5 fN7
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- Morris, George A. Earth slips on the Jordan level marl beds of the Erie canal. (*see* Eng. news, 1898, 40:338-39, 344) 620.5 fN4  
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- Symons, Thomas W. Letter expressing views as to best means to be adopted for continuing and completing the improvement of the state canals, Dec. 27, 1898. (*see* N. Y. (state)—Commerce commission. Report, 1900, 1:163-67) 380 N42
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- Veeder, M. A. Geology of Erie canal; salina marlytes and recent improvements. 7p. O. Lyons, N. Y. 1899. 557.47 P9  
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Includes brief account of the Erie canal.
- Spark, Edwin Erie. The Cumberland road and the Erie canal, a few facts on early history and influence. (*see* Chautauquan, 1900, 30:604-7) 051 qC39
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Illustrations show boats stranded.

#### Salina and Montezuma side-cuts.

- See also* Annual reports, Material relating to history and construction of more than one canal, Oswego canal and river, Management, etc.
- N. Y. (state)—Canals, Committee on. Report on petitions for improving navigation of the Oswego river to Lake Ontario and for opening a navigable communication from the Salina side-cut to the Onondaga lake. (*see* Ass. jour. 1820, 43:657-58)
- N. Y. (state)—Canal commissioners. Report on the memorial of J. Brackett, F. Curtis and others for a reduction of the duties on salt, and for uniting the canal basin at Salina with the Onondaga lake. (*see* Ass. jour. 1821, 44:790)
- N. Y. (state)—Northern and western canals, Committee on so much of the Governor's message as relates to the. Report on petition for a reduction of duty on salt, and for a navigable connection between the Salina side-cut and Onondaga lake and between the said lake and Seneca river. (*see* Ass. jour. 1821, 44:970-72)
- N. Y. (state)—Standing committee. Report on a navigable communication from Salina side-cut, to the Seneca river. 2p. (Ass. doc. 1821, no. 123)

An act authorizing the extension of the Salina side-cut to the navigable waters of the Onondaga lake, passed Apr. 17, 1822. (*see* Laws of New York)

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An act to provide for making a lateral canal from the Erie canal to the salt works at Montesuma, passed Apr. 17, 1826. (*see* Laws of New York)

N. Y. (state)—Canals, Committee on. Report on petition that the branch canal from Syracuse to Salina may be extended to Fort Brewerton. (*see* Ass. jour. 1826, 49:915)

Petition of the manufacturers of salt at Montesuma, for the construction of a canal from Erie canal to the said salt works. 2p. (Sen. doc. 1826, no. 42)

### Junction canal (Erie and Watervliet).

An act to incorporate the Junction canal company, passed Apr. 21, 1828. (*see* Laws of New York)

N. Y. (state)—Canal commissioners. Report on the petition of Stephen Ross and others for authority to make a side-cut from the Erie canal below the locks at the junction of the Champlain canal, in order to form a navigable connection between the Erie canal and the Hudson river above the Troy dam. (*see* Sen. jour. 1828, 1st sess. 51:237)

N. Y. (state)—Canals, Committee on. Report on petition of inhabitants of Troy and Lansingburgh, for a side-cut from the Erie canal to the Hudson river. (*see* Sen. jour. 1828, 1st sess. 51:371-72)

An act, passed Apr. 12, 1833, to amend an act entitled "an act to incorporate the Junction canal company," passed Apr. 21, 1828. (*see* Laws of New York)

N. Y. (state)—Canal fund, Commissioners of. Report on bill authorizing loan to Junction canal company. 6p. (Ass. doc. 1833, no. 305)

Junction canal company. Memorial to the Legislature of New York. 2p. F, bound O. n.p. 1839. 040 P v.223

Circular showing the value of the Junction canal and requesting that it be purchased by the state.

N. Y. (state)—Canal commissioners. Report in relation to Junction canal. 8p. (Sen. doc. 1839, no. 90)

N. Y. (state)—Canals, Committee on. Report on memorial of the Junction canal company offering to sell the canal to the state. 9p. (Ass. doc. 1839, no: 188; or, 1840, no. 191)

N. Y. (state)—Legislature. Concurrent resolutions directing surveys of the Junction canal, passed Feb. 8 and Mar. 9, 1839. (*see* Laws of New York)

An act authorizing the purchase by the state of the side-cut called the Junction canal, passed May 13, 1840. (*see* Laws of New York)

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### BARGE CANAL.

N. Y. (state)—Engineer and Surveyor. The Erie canal of the future. (*see* Annual report for 1893, p.19-26) 626 L1

Roberts, Thomas P. Enlargement of the Erie canal. (*see* International deep waterways association. Proceedings of annual convention, 1895, 1:241-46) 386 In8  
Discussion, p.246-51.

Smith, Alexander R. An existing outlet to the sea. (*see* International deep waterways association. Proceedings of annual convention, 1895, 1:384-89) 386 In8  
Favors nine-foot canal.

Dutton, Chauncey N. Concerning Erie canal improvements. (*see Eng. news*, 1898, 39:64-66) 4500 words. 620.5 FN4

Letter offering comments on editorials on this subject, pages 8-10, 24 and 60-61 of this volume; favors fifteen-foot barge canal under control of general government.

What shall New York do with its canals? (*see Eng. news*, 1898, 39:8-10, 24, 60-61) 2700 words. 620.5 FN4

Editorial discussion favoring federal control.

The future of the New York state canals. (*see Eng. rec.* May 13, 1899, 39:537-38)

620.5 FN7

Statement of the relative merits of estimates for various improvements.

What had best be done with the New York state canals; a symposium. (*see Eng. news*, Aug. 3, 1899, 42:73-74) 4400 words. 620.5 FN4

Editorial summary of replies to the inquiry letter sent out by the expert commission appointed by the Governor, and the arguments presented.

Abstract of the report of the committee on canals of New York state, Jan. 13, 1900. (*see Sci. Amer. sup.* 1900, 49:20,171-73, 20,179-81) 605 FN6

With illustrations and maps.

The canals of New York. (*see Eng. mag.* 1900, 18:925-26) 725 words. 620.5 P1

Editorial on report of committee on canals.

Editorials on the canal problem, (*see Eng. news*, Mar. 1, 1900, 43:144) 192, 312 and 256 words. 620.5 FN4

The Erie canal problem. (*see Sci. Amer.* 1900, 82:66; 1902, 87:304) 605 FK6

N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 287p. O. (Ass. doc. 1900, no. 79) 386 N4269

Contains circular letter of May 1, 1899, presenting five alternative conclusions as to the proper policy for the state to pursue in canal matters, and answers thereto. Some of the answers given are by W. H. Burr, who favored the present project of enlargement of the Oswego and Champlain canals and a 1500-ton barge canal between Buffalo and Albany; S. E. Babcock, for the second proposition, with suggestions as to methods of enlarging locks, elimination of lockage and relocation of Erie canal from Lyons to Syracuse; L. M. Bowers, for the construction of a ship canal by the federal government and the abandonment of the old canals; John Chamberlain, for the enlargement of locks, opposing a ship canal; George Clinton, for completion of 1895 project; L. E. Cooley, for improvements, pending construction by U. S. government of a ship canal via Lake Champlain; E. L. Corthell, opposing further expenditure of large sums on canal enlargement; C. N. Dutton, for a capacious water route across the state; Franklin Edson, for completion of 1895 project, but with main locks on Erie canal enlarged to provide for a future barge canal; J. A. Fairlie, *comp.*, statistical tables and data; G. S. Greene, for 12-ft. barge canal; G. W. Hall, on electric propulsion on the canals; L. M. Haupt and R. R. Hefford, for improvement; A. S. Hewitt, against improvement; W. M. McEchron, for completion of 1895 project, urging immediate completion of improvement on Champlain canal north of Ft. Edward; G. S. Morison, for a continuously descending barge canal; New York board of trade and transportation, for deepening of Erie and Oswego canals to nine feet and Champlain canal to seven feet; New York canal enlargement association, for lock enlargement and deepening of prism to nine feet; H. T. Niles, favoring a 1500-ton barge canal and opposing a ship canal; E. P. North, for a ship canal on Erie route, and pending construction, suggesting deepening present prism to facilitate navigation and encourage boat construction; G. H. Nott, for enlargement of locks to accommodate 2000-ton boats, to be followed by deepening of prism to nine feet; G. W. Rafter, on relocation of Erie canal from Newark to Syracuse, and importance of large transportation companies; resolutions of commercial organizations; Martin Schenck, for a 1200 to 1500-ton barge canal; G. H. Schwab, for 1200 to 1500-ton barge canal; G. B. Sloan, for completion of 1895 project, and construction of the ship canal by U. S. government; H. C. Spalding, for eleven-foot canal and the combination of neighboring locks into single large lifts; T. W. Symons, estimates of cost; F. W. Taussig, against enlargement as it will not meet railway competition, uncertainty of large barge canal, ship canal will not benefit New York; A. W. Tourgée, for construction of double-track freight railway on canal right of way; J. N. Tubbs, for completion of 1895 project; J. D. Van Buren, for completion of 1895 project, giving estimates of construction and transportation for the various propositions; J. A. C. Wright, for a nine-foot canal on present route.

Report; F. V. Greene, chairman. 231p. illus. maps. O. (Ass. doc. 1900, no. 79)

386 N42

1. Shall the canals be abandoned; 2. The ship canal project; 3. Project recommended; 4. Finances; 5. Management.

In the appendices are given some valuable documents on the subject, statistical tables and data relating to canals and commerce of New York.

N. Y. (state)—Governor. Message transmitting report of the canal committee, Jan. 25, 1900. pp. (Ass. doc. 1900, no. 31)

Favors the construction of a 1000-ton barge canal, giving reasons.

New York and its canals. (*see The engineer*, Lond. Feb. 16, 1900, 89:176-77) 2000 words

620.5 FL6

Editorial on the commission's report.

- New York's canal policy, What shall it be? Editorial discussion. (*see Eng. news*, Feb. 8, 1900, 43:96-97) 3000 words. 620.5 fN4
- North, Edward P. Erie canal and transportation. (*see No. Amer. rev.* 1900, 170:121-33) 051 N81
- Service of Erie canal to New York commerce in the past. Desirable to have a channel of distribution which shall reduce freight rates to a minimum, and for this a canal is necessary large enough to pass the largest boats navigating the Great Lakes.
- Obstacles to the proposed Erie canal improvement. (*see Sci. Amer.* 1900, 82:210) 605 fK5
- Our Erie canal policy. (*see Nation*, 1900, 70:85-86) 900 words. 071 qN21
- Raymond, William G. New York's canal problem; a discussion of the report of the advisory committee, appointed by the Governor, 12p. O. 386
- Reprinted from the *Railroad gazette*, Mar. 2, 1900, 32:132-33, 150-51, against enlargement.
- Surveys for the proposed barge canal. Editorial. (*see Eng. news*, 1900, 43:281) 620.5 fN4
- Preliminaries. Meeting of board of consulting engineers, Apr. 27, 1900, for considering high lift-locks.
- Symons, Thomas W. Canals from the Great Lakes to the sea. (*see Forum*, 1900, 29:203-16) 051 F77
- What shall New York do with its canals? (*see Eng. news*, Feb. 1, 1900, 43:80-85) 16,000 words. 620.5 fN4
- Report of the Governor's advisory committee.
- Editorials on canal question. (*see Bradstreet's*) 330.5 fB72
- 1901 29:161, 177, 225 175, 200 and 210 words.
- 1902 30:1. 175 words.
- Electrical barge canal for New York state. (*see Elect. world*, Mar. 2, 1901, 37:363) 350 words. 621.3 fN4
- Editorial on estimates.
- N. Y. (state)—Engineer and Surveyor. Report on the barge canal from the Hudson river to the Great Lakes, Feb. 12, 1901. 1020p. illus. atlas, O. (Ass. doc. 1901, no. 70) 626 Q1a
- Atlas of 34 loose maps and profiles in case (626 qQ1a).
- N. Y. (state)—Governor. Message transmitting report of the State Engineer and Surveyor on the survey for the proposed barge canal, and also estimate for completing the canal under the laws of 1895. 9p. (Sen. doc. 1901, no. 38)
- New York and the Great Lakes. (*see The engineer*, Aug. 30, 1901, 92:221) 300 words. 620.5 fL6
- New York canal plans; barge canal appropriations. (*see Outlook*, 1901, 67:885) 205 C4622
- New York canals. (*see Amer. rev. of revs.* Apr. 1901, 23:397) 200 words. 052 R321
- Editorial on the two plans, that of continuing deepening and enlarging the canals as begun with the \$9,000,000 appropriation and that of a barge canal.
- Remonstrance against the passage of the \$26,000,000 canal bill. 3p. (Ass. doc. 1901, no. 61)
- Rochester chamber of commerce. Report of committee, appointed to accompany the State Engineer and Surveyor on a reconnaissance of the proposed canal routes around the city. (*see N. Y. (state)—Engineer and Surveyor.* Report on the barge canal, 1901, Appendix, p.989-93) 626 O1a
- Committee: G: W. Raftar, F. C. Lauer and J: M. Ives.
- The improvement of the Erie canal. (*see Sci. Amer.* 1902, 86:290-91) 1600 words. 605 fK5
- New York barge canal project again. (*see Eng. news*, 1902, 48:191) 1600 words. 620.5 fN4
- Editorial discussing the report against the Ontario route just rendered by the committee of the canal association of Greater New York.
- The New York canal question. (*see Nation*, 1902, 75:219-20) 071 qN21
- New York canal question again. (*see Eng. news*, 1902, 48:264-65) 4000 words. 620.5 fN4
- New York, Chamber of commerce of. Report on the improvement of the Erie canal, Feb. 6, 1902. (*see Annual report*, 1902, 44:123-29) 381 N42

- Symons, Thomas W. The Ontario route for a barge canal vs. the Seneca-Onesida-Mohawk route. (see Eng. news, 1902, 48:266-67) 4800 words. 620.5 fN4  
An argument against the Ontario route and in favor of the inland route, with editorial discussion.
- An act providing for the construction of the barge canal, passed Apr. 7, 1903. (see Laws of New York)
- Also in *Annual report of State Engineer and Surveyor for 1903*, p.48-61 (626 L1).
- The canal discussion in New York. (see Eng. news, Mar. 19, 1903, 49:254-55) 2000 words. 620.5 fN4
- Editorial discussion of the arguments to be brought before the Legislature on the 1000-ton barge canal and the federal waterway.
- Editorials on the barge canal proposition, and the beginning by its opponents of the campaign against it. (see Bradstreet's, 1903, 81:193 and 465) 175 and 200 words. 330.5 fB72
- Enlarging the Erie canal. (see World to-day, 1903)  
4:702 240 words.  
5:1543. 250 words. 031 qC93
- The Erie canal. (see Outlook, 1903, 75:437-39) 205 C4622
- Erie canal to be enlarged, 1903. (see Amer. rev. of revs. 1903, 28:656) 700 words. 052 R321
- Decision made at the polls. Objects of the enterprise.
- Expression of U. S. Senator Miller for the 9-foot improvement and the adoption of electricity as the motor power on the canals. (see Elect. world, Jan. 3, 1903, 41:36) 100 words. 621.3 fN4
- Governor Odell on the proposed 1000-ton barge canal. (see Eng. news, Jan. 15, 1903, 49:60-61) 1300 words. 620.5 fN4
- Portion of his message to the Legislature.
- New Erie canal project. (see Amer. rev. of revs. 1903, 27:402, 527) 420 words. 052 R321
- Editorials on \$101,000,000 bill.
- N. Y. (state)—Engineer and Surveyor. Reply to questions relative to making an appropriation of \$82,000,000 for the improvement of the Erie, Oswego and Champlain canals. 14p. (Ass. doc. 1903, no. 20)  
Also in *Annual report for 1903*, p. 38-47 (626 L1).  
Revised estimate, \$101,000,000.
- Opinions of engineers on the New York barge canal proposition. (see Eng. news, Oct. 22, 1903, 50:364-68) 9000 words. 620.5 fN4
- Editorial with letters from prominent engineers in reply to a request for their opinions.
- Proposed improvements in the Erie canal. (see Sci. Amer. sup. Jan. 17, 1903, 55:22,615) 1200 words. 605 fN6
- Review of the different plans for improvement, with map.
- Reconstruction of the Erie canal; three schemes. (see Sci. Amer. 1903, 88:36) 605 fK5
- Summary of the case against the Erie canal enlargement. (see R. R. gas. Oct. 23, 1903, 35:760-61) 1800 words. 385 fR132
- Editorial review of the arguments that have been advanced.
- Wilner, M. M. The Erie canal, its past and future. (see Amer. rev. of revs. July, 1903, 28:59-67) 4700 words. 052 R321
- Also in *The thousand-ton barge improvement* by Canal improvement state committee, N. Y. (386 C166).
- Gives an account of the proposed enlargement, reviews the past history and discusses the outlook and New York's industrial position. Illustrated.
- The barge canal across New York state. (see R. R. gas. Apr. 8, 1904, 36:272-74) 2500 words. 385 fR132
- Plan showing the route of the canal, with particulars showing changes, difficulties, etc.
- Canal improvement state committee, New York. The canal system of New York state. 30p. T. N. Y. 1904. N. Y. state library, Sociology section
- Questions and answers, of interest to citizens of New York.
- N. Y. (state)—Engineer and Surveyor. Barge canal (see his Annual report for 1904, 55:34-57) 626 L1
- Contents: Improvement of the Erie, Champlain, and Oswego canals; special investigations; size of barges suitable for use upon the canal; rock section in deep cut, near Rochester; special bank protection; bridges, lock-gates, valves for lock-culverts, etc.; lock and operating devices; the specifications; advisory board of consulting engineers.

The canal law (chapter 338, laws 1894) with amendments to and including the session of the Legislature of 1904; also other general laws and parts of laws pertaining to office of Superintendent of Public Works and the canals of the state. 91p. O. Alb. 1904.

N. Y. state law lib. pamphlets v.212

Fairlie, John A. Canal enlargement in New York state. (see Quarterly journal of economics, 1904, 18:286-92) 330.5 Q2

Supplement to his article in 1900 on *New York canals*.

Franchot files bond and begins work. (see Albany evening jour. Jan. 6, 1904) 350 words.

N. Y. state lib.

N. Y. (state)—Public Works, Superintendent of. Relation of the present canal system to the future barge canal. (see Annual report for 1904, p.16-18) 386 N425

What portions should be maintained after completion of barge canal.

New York canal. (see The engineer, May 20, 1904, 97:509) 160 words. 620.5 fL6

Descriptive statements of proposed barge canal.

Preliminary engineering work on the New York barge canal improvements. (see Eng. rec. 1904, 50:574-77) 3000 words. 620.5 fN7

Route of the 1000-ton barge canal. (see Eng. news, 1904, 51:66) 620.5 fN4

Editorial with map.

Symons, Thomas W. New York's new canal system. (see Marine rev. Mar. 10, 1904) 2000 words.

A review of the proceedings which led to the bill appropriating over \$100,000,000 for canal improvement, with an outline of the work already begun.

—— The projected new barge canal of the state of New York. (see Smithsonian institution. Annual report for 1904, p.751-57) 506 K7a

Reprinted from the *Bulletin of the American Geographical Society*, May, 1904, 36:257-64 (910.6 Am31).

U. S. Military affairs, Committee on. Navigable canals of New York. 2p. O. (U. S.—Senate—58th Cong. 2d Sess. Rep. 1372)

Report that Major T. W. Symons be permitted to act as a member of an advisory board of consulting engineers in connection with the improvement of the navigable canals of New York, 1904.

Adverse report on above, 2p.O. (U. S.—House—58th Cong. 2d Sess. Rep.1594)

By widening canal-locks, lake and coast boats could be utilized. (see Albany evening jour. June 29, 1905) N. Y. state lib.

Would make locks 45 feet wide and 14 feet deep; advantage of the change.

Canal act upheld by Attorney-General Mayer. (see New York herald, Mar. 11, 1905) 1000 words. N. Y. state lib.

Canal bids are legal; no obstacles to an award of the six contracts, says Attorney-General Mayer. (see Albany evening journal. Jan. 26, 1905) 700 words. N. Y. state lib.

Condition of the New York canal improvements. (see Eng. rec. 1905, 51:33) 600 words.

620.5 fN7

Deals with the two obstacles, one relating to the constitutionality of the act, and the other the uncertainty as to the legality of the forms of contract used.

Don't want delay in barge canal construction. (see New York journal of commerce, Feb. 25, 1905) 240 words. N. Y. state lib.

N. Y. (state)—Public works, Superintendent of. Barge canal. (see his Annual report for 1905) 386 N425

Our two great canal projects, Panama ship canal and Erie barge canal. (see Sci. Amer. 1905, 93:314) 605 fK5

Petition to test validity of canal law. (see Albany evening jour. Jan. 31, 1905) 700 words.

N. Y. state lib.

Policy of barge canal opponents. (see New York world, Jan. 13, 1905) 350 words.

N. Y. state lib.

Possible conflict between the state and federal laws. (see Albany argus, Jan. 13, 1905) 550 words. 071 xA11

Brackett resolution.

—— (see Alb. evening journal, Jan. 12 and 17, 1905) 1400 words. N. Y. state lib.



[Scheme to use old canal and save millions—electric towing does it. (see *New York sun*, 1905, Jan. 6) 3300 words. N. Y. state lib.

Validity of canal act. (see *Albany argus*, Jan. 14 and 17, 1905) 400 and 900 words.

071 xA11

Repeal of the act unlikely.

Unconstitutionality of the barge canal act. (see *New York tribune*, Jan. 11, 1905) 300 words. N. Y. state lib.

### CHAMPLAIN CANAL.

See also Material relating to more than one canal, Ship canals, Management, etc.

N. Y. (state)—Canal commissioners. Report on northern canal, estimated cost of construction, description of route, etc., Mar. 18, 1817. (see *Ass. jour.* 1817, 40:588-91) 1900 words. See also their *Annual reports* (626 H7, v1); *Laws in relation to the Erie and Champlain canals* to 1825, 1:287-92 (386 qN42); and *Niles' register*, 1817, 12:89-90 (305 qN59).

Report of board of commissioners on Northern or Champlain canal. (see *Alb. argus*, Mar. 28, 1817) 2200 words. 071 xA1

With routes, estimates, advantages, etc.

Weston, and Benjamin Wright. Report relative to the navigation between Troy and Waterford. 4p. (*Ass. doc.* 1817, Feb. 25)

Northern canal. (see *Alb. argus*, Nov. 30, 1819) 500 words.

071 xA1

From *Sandy Hill times*, Nov. 20, 1819.

Opening of Champlain canal from Fort Edward to Whitehall.

Northern canal. (see *Alb. gazette and daily advertiser*, Sept. 28, 1820) 300 words.

N. Y. state lib.

From *Waterford recorder*. Critical.

N. Y. (state)—Canal commissioners. Specifications in relation to the construction of the Champlain canal. (see Haines, C. G. comp. *Public documents*. 1821. p.307-10)

386 H12

An act relative to the feeder of the Champlain canal, passed Apr. 17, 1822. (see *Laws of New York*)

The great dam at Fort Edward. (see *Niles' register*, Sept. 28, 1822, 23:64) 400 words.

305 qN59

Northern canal. (see *Alb. daily advertiser*, Nov. 29, 1822) 300 words.

N. Y. state lib.

From *Waterford reporter*.

News report on completion of canal to Waterford.

Northern canal. (see *Niles' register*, Dec. 21, 1822, 23:246-49) 1500 words.

305 qN59

Remarks signed "G. W.," Waterford. From the *New York statesman*.

Also in the volume of pamphlets (040 P v.2438)

An act authorising the construction of a canal, from the Champlain canal in Waterford to the Hudson at Troy. 2p. (*Ass. doc.* 1823, no. 215)

An act for extending the Champlain canal. 1p. (*Ass. doc.* 1823, no. 160)

Champlain canal. (see *Alb. daily advertiser*, Jan. 23, 1823) 1600 words. N. Y. state lib.

Signed "Inquirer." From *Troy post*.

Proposing a canal aqueduct across the Hudson at Waterford.

— (see *Alb. daily advertiser*, Mar. 27, 1823) 3000 words.

N. Y. state lib.

Concerning location of terminus at Troy, Waterford, Lansingburg, etc.

— (see *Alb. daily advertiser*, Apr. 17, 1823) 900 words.

N. Y. state lib.

Editorial review concerning continuance of canal to Troy.

N. Y. (state)—Canal commissioners. Report on the memorial of the mayor, aldermen, and commonalty of the city of Troy, concerning location of the canal of said city. 7p. (*Ass. doc.* 1823, no. 207)

N. Y. (state)—Canals, Committee on. Report on memorial for completion of Champlain canal between Fort Miller and Fort Edward. (see *Sen. jour.* 1823, 46:182)

— Report on petition of the mayor, aldermen and commonalty of Troy relative to a canal between Troy and Waterford. 5p. (*Ass. doc.* 1823, no. 156; or, *Ass. jour.* 1823, 46:631-35)

Includes communication from Benjamin Wright and Canvass White.

Northern canal. (see *Alb. daily advertiser*, Apr. 9, 1823) 700 words.

N. Y. state lib.

From *Lake George guardian*.

Concerning public sentiment on continuance of canal between Fort Edward and Fort Miller.

An act authorizing the construction of a canal from the Champlain canal in Waterford to the Hudson at Troy. 2p. (Ass. doc. 1824, no. 87; or, Sen. doc. 1824, no. 159)

Canal from Waterford to Troy. (see Alb. daily advertiser, Mar. 16, 1824) 1600 words.  
N. Y. state lib.

Constitutional objections to proposed canal.

N. Y. (state)—Canals, Committee on. Report on the petition for continuing the Champlain canal from Fort Edward to Fort Miller. 3p. (Sen. doc. 1824, no. 155; or, Sen. jour. 1824, 47:271-73)

Report on the Troy petition for a canal from the Champlain canal near Waterford to their city. (see Ass. jour. 1824, 47:246-47)

Report relative to the navigation of the Champlain canal, from Fort Edward to Fort Miller. 3p. Ass. doc. 1824, no. 82; or, Ass. jour. 1824, 47:469-71)

N. Y. (state)—Select committee. Report on bill, entitled "an act authorizing the construction of a canal from the Champlain canal in Waterford to the Hudson at Troy." (Sen. doc. 1824, no. 158) or, Sen. jour. 1824, 47:288-90)

Troy canal. (see Alb. daily advertiser, Mar. 20, 1824) 700 words. N. Y. state lib.  
Reflections upon constitutional questions involved.

(see Alb. daily advertiser, Mar. 24, 1824) 800 words. N. Y. state lib.  
Signed "Public Faith." Review of the report of the Senate committee.

Troy canal and aqueduct. (see Alb. daily advertiser, Mar. 22, 1824) 1400 words.  
N. Y. state lib.

Signed "A." Objection to and remarks upon the canal.

The Troy canal bill. (see Alb. daily advertiser, Mar. 31, 1824) 2000 words. N. Y. state lib.  
Examination of the provisions of the proposed law, surplus waters, etc.

An act relating to improvement of Champlain canal. 1p. (Sen. doc. 1825, no. 213)

N. Y. (state)—Canals, Joint committee on. Report relative to the extension of the Champlain canal from Fort Edward to Fort Miller. (Sen. doc. 1825, no. 212; or, Sen. jour. 1825, 48:370-74)

An act in addition to an act, entitled "an act relative to the feeder of the Champlain canal," passed Apr. 17. 1p. (Ass. doc. 1826, no. 30)  
Also in *Laws of New York*.

N. Y. (state)—Canal commissioners. Report on practicability of continuing the Champlain canal across the Hudson river at Saratoga falls, by means of an aqueduct. (Ass. doc. 1826, no. 111; Ass. jour. 1826, 49:547-48)

Report relative to completing the feeder from Glens Falls. (see Sen. jour. 1826, 49:465)

Report relative to survey of canal route between Fort Miller and the dam across the Hudson at Saratoga falls. (see Sen. jour. 1826, 49:449)

Reference to report of canal committee of the Assembly, Feb. 12, 1824, and of joint committee on canals on Mar. 21, 1825, with estimates annexed.

N. Y. (state)—Canals, Committee on. Report on expediency of finishing the Glens Falls feeder. (see Ass. jour. 1826, 49:125)

Report on petition of sundry inhabitants of the northern counties of the state, praying that the Champlain canal may cross the Hudson river by means of an aqueduct instead of a towing-path bridge. (see Ass. jour. 1826, 49:674)

Report on petitions and memorials of sundry inhabitants of the south part of Washington county, praying for a side-cut from Champlain canal to Hudson river, between Saratoga and Stillwater falls. (see Ass. jour. 1828, 51:594-95)

N. Y. (state)—Canal board. Report relative to cost of construction and maintenance of Champlain canal. 11p. (Sen. doc. 1836, no. 72)

N. Y. (state)—Canals, Committee on. Report on petitions of inhabitants of Warren, Essex, Montgomery and Saratoga counties praying for the survey of a canal route from the head waters of the Hudson to the Champlain canal feeder. 4p. (Ass. doc. 1838, no. 238)

N. Y. (state)—Canal commissioners. Report on the petition of sundry inhabitants of Washington and Rensselaer counties, for a side-cut from Champlain canal to the Hudson at Stillwater. 6p. (Ass. doc. 1841, no. 232)

N. Y. (state)—Canal board. Report on the various petitions for and remonstrances against, the removal of the Fort Miller dam. 3p. (Ass. doc. 1842, no. 114)

— Report relative to Fort Miller dam. (Ass. doc. 1849, no. 125)

N. Y. (state)—Canals, Committee on. Report on enlargement of Champlain canal. 16p. (Ass. doc. 1850, no. 129)

— Report on the petition of inhabitants of the counties of Washington, Warren and Saratoga, relative to the construction of an aqueduct over the Hudson river. 3p. maps. (Ass. doc. 1850, no. 144) 040 P v.223

N. Y. (state)—Canal commissioner. Communication on condition of Champlain canal where it crosses the Mohawk river, between Cohoes and Waterford. 3p. (Ass. doc. 1853, no. 110)

— Report on condition of Champlain canal. 4p. (Ass. doc. 1857, no. 116)

N. Y. (state)—Engineer and Surveyor. Report on cost required to obtain five feet of water in Champlain canal. 2p. (Sen. doc. 1859, no. 21)

Improvement of Champlain canal. (see Amer. R. R. jour. 1867, 40:152) 620.5 qJ2  
Resolutions in its favor adopted at an Albany meeting.

McElroy, Samuel. Report on the Hudson river and Champlain canal improvement survey 1866. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1867, maps, p. 28-124) 626 L1

N. Y. (state)—Canal Department, Auditor of. Report relative to a survey of the Hudson river to Fort Edward and of the Champlain canal enlargement from tide-water to Whitehall. 111p. (Sen. doc. 1867, no. 37)

N. Y. (state)—Canal board. Report on past and present business of the Champlain canal; its cost up to this time, the propriety, feasibility and probable cost of its enlargement to the size of 54 feet bottom, 58 feet surface and 7 feet deep, in response to resolution of the Assembly, Feb. 26, 1870. (see their Proceedings, 1870, p.87-102) 386 N4264  
Minority report, p.92-102.

N. Y. (state)—Canal Department, Auditor of. Report on business of Champlain canal and probable cost of enlarging. 17p. (Ass. doc. 1870, no. 181)

N. Y. (state)—Engineer and Surveyor. Report on cost of enlarging Champlain canal. 3p. (Ass. doc. 1870, no. 69)

Young, John. Letter in reply to the report of W: J. McAlpine, to the Oswego Board of trade, Nov. 13, 1873. (see U. S.—Senate—43d Cong. 1st Sess. Rep. 307, pt.1, Appendix, p. 136-44)  
Favors Champlain canal improvement.

## OSWEGO CANAL AND RIVER.

See also Annual reports, Material relating to history and construction of more than one canal, Ship canals, Management, and other related headings.

Bates, David S. Communication on survey between Salina and Oswego, through Seneca and Oswego rivers, made by D: S. Bates. (see Ass. jour. 1820, 43:496-503)

Also in *Public documents* compiled by C: G. Haines, p.406-20 (386 H12).

— Report on survey of Oswego river at or adjoining the falls. 7p. (Ass. doc. 1820, no. 57; or, Ass. jour. 1820, 43:316-21)

N. Y. (state)—Canal commissioners. Report of a survey made up the Oswego river. 26p. O. (Ass. doc. 1820, no. 108) 040 P v.223

Includes report of David Thomas relative to Buffalo harbor.

N. Y. (state)—Canals, Committee on. Report on petitions for improving navigation of the Oswego river to Lake Ontario and for opening a navigable communication from the Salina side-cut to the Onondaga lake. (see Ass. jour. 1820, 43:657-58)

N. Y. (state)—Canal system, Committee on the. Report on the petitions for improving the navigation between Salina and Lake Ontario. 1p. (Sen. doc. 1823, no. 147)

An act to incorporate the Oswego canal company, passed Apr. 23, 1823. (see Laws of New York)

An act to provide for the survey of the Oswego river, and for making estimates of probable expense of completing the canal from Salina to Lake Ontario. 1p. (Sen. doc. 1823, no. 148)

N. Y. (state)—Canal commissioners. Report on bill to incorporate the Oswego canal company. (Sen. jour. 1823, 46:270)

— Report on petitions of inhabitants of Seneca and Oswego counties, praying for improvement of navigation of Oswego river. (see Sen. jour. 1823, 46:89)

An act, "to connect the Erie canal with the waters of lake Ontario and the St. Lawrence." 1p. (Sen. doc. 1824, no. 177)

N. Y. (state)—Canal commissioners. Report relative to survey and estimate of expense of improving the navigation between Onondaga lake and Lake Ontario *via* Seneca and Oswego rivers, Holmes Hutchinson, engineer. (Sen. doc. 1824, no. 144; or, Sen. jour. 1824, 47:261-65)

N. Y. (state)—Canals, Committee on. Report on petitions of the inhabitants of the counties of Oswego, Jefferson and St. Lawrence, praying that Lake Ontario may be connected with the Erie canal. (Sen. doc. 1824, no. 174) or, Sen. jour. 1824, 47:312-14)

An act to provide for connecting the Erie canal with the waters of Lake Ontario, by a canal, passed Apr. 20, 1825. (*see* Laws of New York)

Not complete in *Ass. doc.* 1825, no. 169.

Memorial of inhabitants of Oswego relative to the improvement of the navigation of the Oswego river. 5p. (*Ass. doc.* 1825, no. 159)

N. Y. (state)—Canals, Joint Committee on. Report relative to the improvement of the Oswego river. 2p. (*Ass. doc.* 1825, no. 168)

Memorial of the citizens of the county of Oswego, and others, on the subject of the Oswego canal. 5p. (*Ass. doc.* 1826, no. 216)

N. Y. (state)—Canals, Committee on. Report on two petitions of inhabitants of county of Oswego, protesting against the erection of a dam in the Oswego river. (*see* Sen. jour. 1826 49:430-31)

Bronson, Alvin. Memorial relative to Oswego canal company. 12p. (*Ass. doc.* 1831 no. 348)

N. Y. (state)—Canals, Committee on. Report on memorial relative to Oswego canal company. 2p. (*Ass. doc.* 1831, no. 362)

N. Y. (state)—Select committee. Report on the petition of inhabitants of the county of Oswego for an act directing an exploration and survey of an improved navigation from Lake Ontario to the Hudson. 11p. (*Ass. doc.* 1834, no. 380)

N. Y. (state)—Canal commissioners. Report relative to lands overflowed by water on the Oswego canal. 32p. (*Ass. doc.* 1838, no. 112)

N. Y. (state)—Canal board. Communication relative to petitions for enlargement of Oswego canal. 2p. (*Ass. doc.* 1839, no. 357)

N. Y. (state)—Canal commissioners. Report on petition of inhabitants of Schroepfel, Granby, Volney and Lysander, praying for removal of dam at Oswego falls and the Horseshoe dam, because of unhealthy conditions caused by them. 4p. (*Ass. doc.* 1842, no. 167)

N. Y. (state)—Canals, Committee on. Report relative to dam at Oswego falls. 4p. (*Ass. doc.* 1842, no. 167)

N. Y. (state)—Canal commissioners. Report on dam on Oswego falls and Horseshoe dam. 16p. (*Ass. doc.* 1843, no. 93)

N. Y. (state)—Canal board. Report on bill to require canal commissioners to take charge of side-cut canals in village of Liverpool. 3p. (Sen. doc. 1845, no. 99)

N. Y. (state)—Canals, Committee on. Report relative to Oswego canal enlargement. 2p. (*Ass. doc.* 1851, no. 129)

N. Y. (state)—Select committee. Report on the bill in relation to the Oswego canal. 8p. (Sen. doc. 1851, no. 59)

N. Y. (state)—Claims, Committee on. Report on completion of sections 20 and 21, Oswego canal enlargement. 4p. (*Ass. doc.* 1860, no. 137)

N. Y. (state)—Engineer and Surveyor. Report on state dam at Phoenix. 4p. (*Ass. doc.* 1862, no. 131)

N. Y. (state)—Canal board. Report relative to dams on Oswego canal. 2p. (*Ass. doc.* 1864, no. 163)

### CAYUGA AND SENECA CANAL.

*See also* Annual reports, Material relating to history and construction of more than one canal, Cayuga lake, Seneca lake, and other related headings.

An act to incorporate the Seneca lock navigation company, passed Apr. 6, 1813. (*see* Laws of New York)

An act to amend an act, entitled "an act to incorporate the Seneca lock navigation company," passed Apr. 13, 1814. (*see* Laws of New York)

An act for the relief of the Seneca lock navigation company, passed Mar. 21, 1817. (*see Laws of New York*)

N. Y. (state)—Canal commissioners. Report on memorial of Seneca lock navigation company, soliciting subscription for a certain amount of their stock. (*see Sen. jour.* 1820, 43:85)

Canal from Seneca lake to the Erie canal. Editorial. (*see Niles' register*, Mar. 30, 1822, 22:68) 250 words. 305 qN59

Notices of the petition and of the adverse report of a committee, relative to a canal from Seneca lake to the Erie canal. (*see Ass. jour.* 1822, 45:695 and 724-25)

Report of a committee appointed at a meeting of inhabitants of the country bordering on Seneca lake, held at Geneva, Dec. 13, 1821, for the purpose of ascertaining the most eligible route for a canal from Seneca lake to the Erie canal. 22p. O. Geneva, 1822. 040 P v.1947

An act authorising the construction of the Cayuga and Seneca canal, passed Apr. 20, 1825. (*see Laws of New York*)

N. Y. (state)—Canals, Joint committee on. Report on petitions for improving the navigation from the Erie canal to the Cayuga and Seneca lakes. (*see Ass. jour.* 1825, 48:688)

N. Y. (state)—Canal commissioners. Communication on the petition of Chauncey Marshall, Ephraim Chapin and other inhabitants of the county of Seneca relative to the level for the construction of the Cayuga and Seneca canal. (*see Sen. jour.* 1827, 1st sess. 50:418-20)

An act to amend an act, entitled "an act authorizing the construction of the Cayuga and Seneca canal. 1p. (Ass. doc. 1828, no. 237)

Also in *Laws of New York*.

Bill entitled "an act directing the construction of a lateral canal from the Cayuga and Seneca canal to East Cayuga. 1p. (Ass. doc. 1828, no. 53)

Also in *Laws of New York*.

N. Y. (state)—Canal commissioners. Report on several questions relative to the Cayuga and Seneca canal. (Ass. doc. 1828, no. 154; or, Ass. jour. 1828, 51:711-13)

N. Y. (state)—Canal fund, Commissioners of. Report on "the amount of damages appraised under the ninth section of the act entitled 'an act for the construction of the Cayuga and Seneca canal.' " (*see Ass. jour.* 1828, 51:1011-12)

N. Y. (state)—Canals, Committee on. Report relative to the construction of a canal from Cayuga and Seneca canal to East Cayuga. 2p. (Ass. doc. 1828, no. 52; or, Ass. jour. 1828, 51:370-71)

N. Y. (state)—Grievances, Committee on. Report relative to the Cayuga and Seneca canal. 4p. (Ass. doc. 1828, no. 236)

An act authorising the investment of part of the school fund in stock to be created for the construction of Cayuga and Seneca canal, passed Apr. 21. 1p. (Sen. doc. 1829, no. 137)

Also in *Laws of New York*.

An act making appropriations to complete the Cayuga and Seneca canal, passed Apr. 30, 1829. (*see Laws of New York*)

An act making further appropriations to complete the Cayuga and Seneca canal, and for other purposes, passed Apr. 30, 1829. (*see Laws of New York*)

N. Y. (state)—Canal board. Report on petition of inhabitants of Seneca Falls, for enlargement of Cayuga and Seneca canal. 3p. (Ass. doc. 1839, no. 367)

N. Y. (state)—Canal commissioners. Report on bill for regulation of water in Cayuga and Seneca canal. 2p. (Sen. doc. 1839, no. 44)

— Report on Cayuga and Seneca canal. 4p. (Ass. doc. 1845, no. 246)

N. Y. (state)—Canal board. Report of injury to water-power of Seneca river from construction of Cayuga and Seneca canal. 15p. (Ass. doc. 1846, no. 144)

N. Y. (state)—Engineer and Surveyor. Report on reports of Charles W. Wentz relative to aqueduct across Seneca river to connect Cayuga and Seneca canals. 2p. (Sen. doc. 1864, no. 101)

N. Y. (state)—Public Works, Superintendent of. Report on effect of dredging and lowering outlet of Cayuga lake on Cayuga and Seneca canal. 1p. (Ass. doc. 1885, no. 159)

## BLACK RIVER CANAL.

*See also* Annual reports, Material relating to history and construction of more than one canal, and other related headings.

An act authorizing William Waring and others to construct a canal through certain lands in the county of Jefferson, and for other purposes. 2p. (Ass. doc. 1823)

N. Y. (state)—Attorney-General. Communication on the application for a canal in Jefferson county. (see Ass. jour. 1823, 46:423-24)

N. Y. (state)—Select committee. Report as to a canal in Jefferson county. (see Ass. jour. 1823, 46:488-89)

——— Report on the subject of the Black River canal. (see Ass. jour. 1823, 46:390-91)  
Questions of legal nature which arose.

An act to incorporate the Black River canal company. 6p. (Sen. doc. 1828, no. 25)  
Also in *Laws of New York*.

An act to incorporate the Jefferson county canal company, passed Apr. 15, 1828. (see *Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on a petition for a law authorizing Vincent Le Ray de Chaumont and his associates to construct a canal from Rome to the foot of the High falls on Black river. (Sen. doc. 1828, no. 24; or, Sen. jour. 1828, 1st sess. 51:84-85)

——— Report on memorials relative to the construction of the Black River canal. 44p. (Ass. doc. 1829, no. 146; or, Ass. jour. 1829, 52:659-64 and Appendix G)  
Includes report by Alfred Cruger, civil engineer, and views of Benjamin Wright.

N. Y. (state)—Legislature. Concurrent resolutions for the survey of a route for a canal from Rome to the High falls of the Black river, passed Mar. 24, 1829. (see *Laws of New York*)

An act directing the survey of a canal route from Rome to the High falls of the Black river, passed Apr. 6, 1830. (see *Laws of New York*)

N. Y. (state)—Canal commissioners. Report on survey of canal route from Rome to High falls of Black river. 23p. (Ass. doc. 1831, no. 229)

N. Y. (state)—Canals, Committee on. Report relative to the construction of the Black River canal, by B. P. Johnson; also reports by A. Cruger and B. Wright; and draught of an act to incorporate the Black river canal company. 33p. (Ass. doc. 1831, no. 287)

An act to incorporate the Black river company, passed Apr. 17, 1832. (see *Laws of New York*)

Black River canal or railroad. (see Amer. R. R. jour. 1832, 1:385) 225 words. 620.5 qJ2

Letter to the editor, signed "V. L." on the work of the Black river company. (see Amer. R. R. jour. 1832, 1:388) 3500 words. 620.5 qJ2

Object is to connect by railroads or canals the Erie canal between Rome and Herkimer with Lake Ontario at Sackett's harbor.

An act directing the survey of a canal route from the High Falls, on the Black river, to the Erie canal, passed Apr. 22, 1834. (see *Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on petitions of citizens of Jefferson, Lewis, Oneida and St. Lawrence counties, for construction of canal from Erie to High falls of Black river. 12p. (Ass. doc. 1834, no. 273)

Black River canal convention. Proceedings, Oct. 1, 1835. (see Amer. R. R. jour. 1835, 4:345-46) 1000 words. 620.5 qJ2

Called to devise measures to forward construction of Black River canal.

N. Y. (state)—Canal commissioners. Report in relation to survey of Black River canal. 72p. (Ass. doc. 1835, No. 58) 626 H7

N. Y. (state)—Canals, Committee on. Report on Assembly bill for construction of Black River canal. 5p. (Sen. doc. 1835, No. 77)

——— Report on several petitions for a canal from Rome to the Black river. 16p. (Ass. doc. 1835, no. 150)

An act for the construction of the Black River canal and Erie canal feeder, passed Apr. 19, 1836. (see *Laws of New York*)

Black River canal. (see Alb. daily argus, Jan. 13, 1836) 1200 words. 071 xAll  
Address to the public advocating constructing the canal.

- Black River canal. (see Alb. daily argus, Apr. 18, 1836) 27,200 words. 071 xAll  
 Speech of Francis Seger in the Senate on the bill for the construction of the canal.  
 — (see Alb. daily argus, May 19, 1836) 12,000 words. 071 xAll  
 Speech of Micah Sterling in the Senate on the bill for the construction of the canal.  
 Ely, Sumner. Black River canal. (see Alb. daily argus, Apr. 26, 1836) 4000 words. 071 xAll  
 Speech in the Assembly on the bill for its construction.  
 Memorial of committee appointed at a canal convention of delegates from counties interested in construction of Black River canal. 16p. (Sen. doc. 1836, no. 21)  
 N. Y. (state)—Canals, Committee on. Report on petitions and memorials relative to the construction of the Black River canal. 15p. (Sen. doc. 1836, no. 36)  
 U. S.—Treasury, Secretary of the. Letter transmitting a plan and estimate for improving the mouth of Black river, in the state of New York, 1837, 6p. map. O. (U. S.—House—24th Cong. 2d Sess. Doc. 74)  
 N. Y. (state)—Canals, Committee on. Report on petitions of J. C. Petibone and others for construction of lateral canal from Delta to Black River canal. 2p. (Ass. doc. 1838, no. 91)  
 N. Y. (state)—Canals, Committee on. Report on petitions of inhabitants of Jefferson and St. Lawrence counties, for extension of Black River canal. 2p. (Ass. doc. 1838, no. 213)  
 An act authorising a survey of the northern termination of the Black River canal, passed May 3, 1839. (see Laws of New York)  
 Black River canal. (see Alb. daily argus, Sept. 9, 1839) 900 words. 071 xAll  
 Report of meeting held to urge expedition in its construction.  
 Black River canal meeting. (see Alb. evening jour. Sept. 7, 1839) 800 words. N. Y. state lib.  
 Convention of delegates from towns in Lewis and Jefferson counties, called to expedite the construction of the canal.  
 — (see Alb. evening jour. Sept. 30, 1839) 800 words. 071  
 Report of meeting of inhabitants of Lewis county, at Leyden.  
 Canal from Carthage to Lake Ontario. (see Alb. daily argus, Jan. 9, 1839) 800 words. 071 xAll  
 Report of meeting of citizens of Jefferson county to promote its construction.  
 N. Y. (state)—Canal board. Communication respecting Black River canal. 5p. (Ass. doc. 1839, no. 391)  
 N. Y. (state)—Canal commissioners. Report relative to estimated cost of Black River canal. 9p. (Ass. doc. 1839, no. 360)  
 N. Y. (state)—Canals, Committee on. Report on petitions for survey of canal route from Carthage to Lake Ontario, St. Lawrence river and Ogdensburgh. 2p. (Ass. doc. 1839, no. 197)  
 — Report on petition of J. C. Petibone and others for construction of lateral canal from Delta to Black River canal. 2p. (Ass. doc. 1839, no. 68)  
 N. Y. (state)—Canal commissioners. Report of survey for continuation of Black River canal. 120p. map. (Ass. doc. 1840, no. 233)  
 N. Y. (state)—Select committee. Report on bill, entitled "an act for the extension of the Black River canal. 5p. (Ass. doc. 1840, no. 345)  
 Canal meeting. (see Alb. evening jour., Feb. 12, 1841) 400 words. N. Y. state lib.  
 Meeting of citizens of Jefferson and Lewis counties interested in completion of Black River canal.  
 N. Y. (state)—Canals, Committee on. Report on petitions for the extension of Black River canal. 11p. (Ass. doc. 1841, no. 234)  
 N. Y. (state)—Canal commissioners. Report on amount needed to finish Black River canal. 26p. (Sen. doc. 1843, no. 49)  
 Memorial relative to the completion of the Black river canal. 6p. (Ass. doc. 1845, no. 151)  
 N. Y. (state)—Canal commissioners. Report on expense of completing Black River canal from Boonville to Rome. 4p. (Ass. doc. 1845, no. 131)  
 N. Y. (state)—Canal Commissioner and State Engineer and Surveyor. Report on Black river improvement. 2p. (Ass. doc. 1859, no. 75)  
 N. Y. (state)—Engineer and Surveyor. Report on Black river improvement 4p. (Ass. doc. 1859, no. 31)

N. Y. (state)—Canal Commissioner and State Engineer and Surveyor. Report on Black river improvement. 2p. (Sen. doc. 1863, no. 44)

N. Y. (state)—Canal board. Report on Black river improvement. 2p. (Sen. doc. 1864, no. 72)

McAlpine, William J. Waves of translation in fresh water. (*see Amer. soc. civ. engs*, 1870, 1:333-43) 620.6 N2  
Illustrated by the incident of the break in the Black river reservoir embankment, Apr. 21, 1869.

N. Y. (state)—Canal Department. Auditor of the. Report in relation to Black River canal. 1p. (Ass. doc. 1878, no. 62)

### BALDWINVILLE CANAL AND SENECA RIVER TOWING-PATH.

*See also* Annual reports, Material relating to history and construction of more than one canal, Seneca river, etc.

An act to continue in force the act passed Feb. 24, 1809, authorising J. C. Baldwin to erect a dam across the Seneca river, passed Apr. 7, 1827. (*see Laws of New York*)

N. Y. (state)—Select committee. Report relative to tolls on the canal around the falls at Baldwinsville. 3p. Ass. doc. 1835, no. 232  
1p. Ass. doc. 1836, no. 141

Baldwin, Stephen W. and Harvey. Remonstrance against the passage of a bill abolishing or regulating tolls on vessels passing through the lock and canal at Baldwinsville, Mar. 23, 1836. 31 p. O. n. p., n. d. 040 P v.477

N. Y. (state)—Canal Commissioners. Report on petition of inhabitants of Onondaga county, for tow-path on Seneca river. 2p. (Ass. doc. 1836, no. 127)

N. Y. (state)—Canal board. Communication in relation to the Oneida Lake canal and feeder and Seneca river towing-path. 2p. (Sen. doc. 1841, no. 76)

— Report on improvement of Seneca river at Baldwinsville. 15p. (Sen. doc. 1850, no. 94)

An act to regulate the management of the Seneca river improvement and Baldwinsville canal, passed Apr. 15, 1854. (*see Laws of New York*)

An act to provide for the expense of changing the location of a portion of the Baldwinsville canal, and rebuilding the locks thereon, passed May 5, 1863. (*see Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on petition for change in location of Baldwinsville canal. 6p. (Ass. doc. 1863, no. 27)

An act making an appropriation to pay Root, Bennett & Co. for services in removing location of Baldwinsville canal, passed Apr. 25, 1864. (*see Laws of New York*)

An act to improve the navigation of the Baldwinsville canal, passed May 22, 1872. (*see Laws of New York*)

### ONEIDA RIVER IMPROVEMENT.

*See* Oneida Lake canal and River improvement.

### SHINNECOCK AND PECONIC CANAL.

*See also* Long Island canal company.

An act to extend the time for receiving subscriptions to Peconick river navigation company, passed Mar. 29, 1809. (*see Laws of New York*)

An act to incorporate the Peconic navigation company, passed Mar. 10, 1835. (*see Laws of New York*)

N. Y. (state)—Legislature. Concurrent resolutions relative to a survey for a canal between Peconic and Shinnecock bays, passed May 9 and 14, 1879. (*see laws of New York*)

N. Y. (state)—Engineer and Surveyor. Report on proposed canal connecting Peconic and Shinnecock bays. 3p. (Ass. doc. 1880, no. 108)

— Shinnecock and Peconic canal. (*see Annual report for* 1892, p.26-28; 1895, p.18-19, 281; 1896, p. 29-32; 1901, p.41-42; 1902, p.31-32; 1903, p.31-32) 626 L1



## CHEMUNG CANAL.

*See also* Annual reports, Material relating to history and construction of more than one canal, and other related headings.

An act for opening the navigation between the head waters of the Seneca lake and the Chemung river, passed Mar. 31, 1815. (*see* Laws of New York)

Seneca and Susquehanna lock navigation company. (*see* Niles' register, June 21, 1817, 12:272) 175 words. 305 qN59

Refers to act of Pennsylvania Legislature, Mar. 11, 1817, and report to be made to next Legislature.

Pa. (state)—Legislature. Act to authorise the Governor to appoint commissioners to explore the route of the intended canal for uniting the waters of the Seneca lake and Tioga river in the state of New York. (*see* Ass. jour. 1818, 41:16-17)

N. Y. (state)—Select committee. Report in favor of a survey of the route and an estimate of the expense of a canal between Seneca lake and Tioga river. (Ass. doc. 1824, no. 143; Ass. jour. 1824, 47:743-44)

An act authorising the construction of a canal from the head of Seneca lake to Newtown. 2p. (Ass. doc. 1826, no. 242)

N. Y. (state)—Canals, Committee on. Report on "an act authorising the construction of a canal from the head of Seneca lake to Newtown." (*see* Sen. jour. 1827, 1st sess. 50:290-96)

Bill entitled "an act authorizing the construction of a canal from the head of Seneca lake to Newtown." (Ass. doc. 1827, no. 32; or, Sen. jour. 1827, 1st sess. 50:411-12)

Chemung canal. (*see* Alb. argus and gazette, Feb. 12 and 14, 1827) 4000 words.

Debate in the Assembly on the final passage of the bill for its construction.

071 xAll

— (*see* Alb. argus and gazette, Feb. 16, 1827) 1600 words.

071 xAll

Commercial advantages fostered by its construction.

— (*see* Alb. argus and gazette, Mar. 14, 1827) 400 words.

071 xAll

Critical.

N. Y. (state)—Canals, Committee on. Report on petitions for canal from Seneca lake to Chemung river. (*see* Ass. jour. 1827, 50:246-47)

Spencer, John H. Speech in the Senate on the Chemung canal bill. (*see* Alb. argus and gazette, Mar. 27, 1827) 3600 words. 071 xAll

Chemung canal. (*see* Alb. daily advertiser, Feb. 4, 1828) 700 words. N. Y. state lib.

Report of meeting at Geneva of citizens favoring its construction.

N. Y. (state)—Canals, Committee on. Report on petitions and memorials praying for canals from Newtown and Bath to connect the navigation of the Chemung river and the Cohocton river with the waters of Seneca lake and the Erie canal. (Ass. doc. 1828, no. 146; or Ass. jour. 1828, 51:680-88)

An act authorizing the construction of a canal from the head of Seneca lake to Elmira, passed Apr. 15, 1829. (*see* Laws of New York)

N. Y. (state)—Canals, Committee on. Report on petitions, praying for the construction of Chemung canal. (*see* Ass. jour. 1829, 52:356-61)

N. Y. (state)—Canal commissioner. Report on the Chemung and Crooked Lake canals.

41p. Ass. doc. 1830, no. 97

19p. Ass. doc. 1830, no. 195.

Doc. 97 includes report of Holmes Hutchinson.

N. Y. (state)—Canals, Committee on. Report on the Chemung canal 3p. (Ass. doc. 1830, no. 326)

Proceedings at the breaking of the ground for the Chemung canal. (*see* Niles' register, Aug. 7, 1830, 38:417) 400 words. 305 qN59

Arrival of the first boat with coal by the Chemung canal. Editorial. (*see* Alb. daily argus, July 29, 1840) 700 words. 071 xAll

N. Y. (state)—Canal commissioners. Report relative to improvement of Chemung canal. 21p. (Ass. doc. 1840, no. 161)

Includes report of J. D. Allen relative to the condition of the locks on the canal.

N. Y. (state)—Canals, Committee on. Report relative to the improvement of the Chemung canal. 5p. (Sen. doc. 1840, no. 105)

N. Y. (state)—Canal commissioners. Report relative to estimated cost of a canal from the head of Seneca lake to Havana. 5p. (Sen. doc. 1841, no. 50)

N. Y. (state)—Canals, Committee on. Report in relation to the further improvement of the Chemung canal. 3p. (Sen. doc. 1841, no. 61)

——— Report on the petition for the construction of a canal from Havana to the head of Seneca lake. 1p. (Ass. doc. 1841, no. 174)

N. Y. (state)—Canals, Committee on. Report on the extension of the Chemung canal feeder. 1p. (Ass. doc. 1842, no. 188)

N. Y. (state)—Canal commissioners. Report on improvements at intersection of Chemung canal with inlet of Seneca lake. 2p. (Sen. doc. 1845, no. 55)

N. Y. (state)—Canals, Committee on. Report on proposed connection with public works of Pennsylvania. 1p. (Ass. doc. 1846, no. 112)

N. Y. (state)—Canal board. Report on improvement of Chemung canal at Corning. 2p. (Sen. doc. 1863, no. 65)

An act to provide for the disposition and sale of certain lateral canals of this state, and the lands, rights and other property connected therewith, passed June 4, 1877. (*see Laws of New York*)

An act to amend chap. 404, laws of 1877, entitled "an act to provide for the disposition and sale of certain lateral canals of this state, and the lands, rights and other property connected therewith," passed May 23, 1878. (*see Laws of New York*)

An act further to amend chap. 404, laws of 1877, relative to disposition and sale of certain lateral canals, etc., passed June 18, 1879. (*see Laws of New York*)

An act to sell and release the right, title and interest of the state in the Chemung canal, and to make an appropriation therefor, passed June 10, 1881. (*see Laws of New York*)

N. Y. (state)—Governor. Message on abatement of nuisance. 1p. (Sen. doc. 1881, no. 71)

Kuichling, Emil. Report on drainage of abandoned canal at village of Horseheads, with map. (*see N. Y. (state)—Health, Board of. Annual report for 1883, 4:381-91*)

614.09747 O0

N. Y. (state)—Health, Board of. Report on condition of abandoned canal north of Elmira city line. (*see Annual report for 1884, 5:216-21*)

614.09747 O0

Wilson, O. S. Plan for drainage of the Chemung canal prism, near the city of Elmira, with maps. (*see N. Y. (state)—Health, Board of. Annual report for 1884, 5:223-26*)

614.09747 O0

——— Plan for drainage of the summit level of the Chemung canal prism from Horseheads to Pine Valley, with maps. (*see N. Y. (state)—Health, Board of. Report for 1884, 5:346-60*)

614.09747 O0

——— Report on drainage of Chemung canal prism and adjoining marsh in the village of Horseheads, with maps. (*see N. Y. (state)—Health, Board of. Annual report for 1884, 5:159-64*)

614.09747 O0

N. Y. (state)—Health, Board of. Report on drainage of prism of the abandoned Chemung canal between North Elmira and Pine Valley. (*see Annual report for 1885, 6:192-94*)

614.09747 O0

——— Report on plan for the drainage of the abandoned Chemung canal, in village of Havana. (*see Annual report for 1885, 6:196-98*)

016.09747 O0

Brown, Charles C. Report on plans for drainage of portions of abandoned Chemung canal at Millport and lower Pine Valley, with map. (*see N. Y. (state)—Health, Board of. Report for 1889, 10:245-46*)

614.09747 O0

N. Y. (state)—Engineer and Surveyor. Report on the condition of the abandoned Chemung canal and the Chemung canal feeder, with plans to abate nuisances. (*see Annual report for 1892, p.277-322*)

626 L1

### CROOKED LAKE CANAL.

*See also* Annual reports, Material relating to history and construction of more than one canal, and other related headings.

N. Y. (state)—Canals, Committee on. Report in favor of a bill requiring the Surveyor-General to explore and take the level of a certain contemplated canal between Seneca lake and Bath. (*see Ass. jour. 1823, 46:553-54*)

N. Y. (state)—Legislature. Concurrent resolution for a survey of a canal from Seneca lake to Crooked lake, and from Crooked lake to Bath, Apr. 19, 1828. (*see Laws of New York*)

Canal meeting. (see Alb. daily advertiser, July<sup>23</sup>, 1828) 600 words. N. Y. state lib.  
Report of meeting of citizens of Steuben and Yates counties to promote construction of a  
canal connecting Cohocton river with Seneca lake.

An act authorizing the construction of the Crooked Lake canal, passed Apr. 11, 1829. (see  
Laws of New York)

[An act authorizing the construction of the Penn-Yan canal. 2p. (Sen. doc. 1829, no. 139)

N. Y. (state)—Canal commissioners. Report relative to the survey of a canal route from  
Seneca lake to Bath. 11p. (Sen. doc. 1829, no. 84)

N. Y. (state)—Canals, Committee on. Report on petition for construction of a<sup>2</sup> canal from  
Bath to the head of Crooked lake, and from the foot of Crooked lake to the Seneca lake. (Sen.  
doc. 1829, no. 138; or, Sen. jour. 1829, 52:275-77)

Thomas, David. Survey of a canal route from the Seneca lake to the village of Bath. 10p. Q.  
(see Sen. jour. 1829, v.52. Appendix D)

N. Y. (state)—Canal Commissioners. Report on the Chemung and Crooked Lake canals.

41p. Ass. doc. 1830, no. 97

19p. Ass. doc. 1830, no. 195

Doc. 97 includes report of Holmes Hutchinson.

Bouck, William C. Crooked Lake canal. (see Amer. R. R. jour. 1833, 2:131-32)

620.5 qJ2

Remarks on the work on the canal.

N. Y. (state)—Canal commissioners. Report on resolution of Assembly relative to Crooked  
Lake canal. 18p. (Ass. doc. 1835, no. 343)

N. Y. (state)—Select committee. Report on the petition of the owners of hydraulic works  
on the outlet of the Crooked lake, and also the petitions of sundry inhabitants of the counties of  
Ontario and Wayne. 9p. (Ass. doc. 1835, no. 369)

N. Y. (state)—Canal commissioners. Report on petitions in relation to changing upper level  
of Crooked lake canal. 5p. (Ass. doc. 1837, no. 203)

N. Y. (state)—Engineer and Surveyor. Report on improvement of upper portion of Crooked  
Lake canal. 2p. (Ass. doc. 1856, no. 117)

N. Y. (state)—Canal board. Report on dam of Crooked Lake canal. 6p. (Ass. doc. 1858,  
no. 135)

N. Y. (state)—Attorney-General. Opinion on "whether there are any constitutional objec-  
tions to the abandonment of the Crooked Lake canal and the sale of the same by the state." 2p.  
(Ass. doc. 1872, no. 116)

N. Y. (state)—Canal Department, Auditor of. Report on extension of Crooked Lake canal.  
3p. (Ass. doc. 1872, no. 90)

An act to provide for the disposition and sale of certain lateral canals of this state, and the  
lands, rights and other property connected therewith, passed June 4, 1877. (see Laws of New  
York)

An act relating to the disposition of the prism and banks of the Crooked Lake canal, passed  
Apr. 18, 1878. (see Laws of New York)

An act to amend chap. 404, laws of 1877, entitled "an act to provide for the disposition and  
sale of certain lateral canals of this state, and the lands, rights and other property connected  
therewith," passed May 23, 1878. (see Laws of New York)

An act further to amend chap. 404, laws of 1877, relative to disposition and sale of certain  
lateral canals, etc. passed June 18, 1879. (see Laws of New York)

### ONEIDA LAKE CANAL AND RIVER IMPROVEMENT.

See also Annual reports, Material relating to history and construction of more than one  
canal, and other related headings.

An act authorizing the lowering of Oneida lake and improving the navigation of Oneida river.  
2p. (Ass. doc. Mar. 1, 1828)

N. Y. (state)—Select committee. Report relative to the lowering of Oneida lake and the  
improvement of the navigation of Oneida river. 5p. (Ass. doc. Mar. 1, 1828)

With Judge Wright's letter and opinion.

An act authorizing the canal commissioners to lower Oneida lake, and improve the navigation of Oneida river, passed Apr. 30. 1p. (Ass. doc. 1829, no. 121)

Also in *Laws of New York*.

N. Y. (state)—Canal commissioners. Report on the subject of lowering the Oneida lake. 4p. (Ass. doc. 1829, no. 120; or, Ass. jour. 1829, 52:431-33)

N. Y. (state)—Select committee. Report on memorials from citizens of Oswego, Oneida, Onondaga and Madison relative to the lowering of Oneida lake and improving the navigation of Oneida river. (Ass. doc. 1829, no. 119; or, Ass. jour. 1829, 52:555-57)

N. Y. (state)—Canal commissioners. Report in relation to lowering Oneida lake. 12p. (Ass. doc. 1830, no. 68)

N. Y. (state)—Canals, Committee on. Report on petition for an act authorizing the lowering of Oneida lake. 4p. (Ass. doc. 1830, no. 225)

N. Y. (state)—Select committee. Report relative to the construction of a dam across the Oneida river, at Oak Orchard reef. 5p. (Sen. doc. 1830, no. 137)

N. Y. (state)—Canal commissioners. Report on petition to erect a wing dam in Oneida river near Caughanoy reef. 2p. (Ass. doc. 1831, no. 274)

N. Y. (state)—Select committee. Report on the petition of inhabitants of the counties of Oneida, Madison and Oswego, for an act incorporating a company with power to construct a canal from the Erie canal to Oneida lake. 3p. (Ass. doc. 1831, no. 49)

An act to incorporate the Oneida lake canal company, passed Mar. 22, 1832. (*see Laws of New York*)

N. Y. (state)—Canal board. Report on bill to incorporate Oneida lake canal company. 4p. (Sen. doc. 1832, no. 64)

Report on petition of Oneida lake canal company setting forth the importance and public advantages to be derived from the construction of said canal. 4p. (Ass. doc. 1833 no. 196)

An act to amend an act to incorporate the Oneida lake canal company, passed Apr. 13, 1835. (*see Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on petitions for act to improve Oneida and Seneca rivers. 5p. (Ass. doc. 1836, no. 264)

N. Y. (state)—Canal commissioners. Report on petition of J. I. Cook and T. Jenkins, for law authorizing purchase by the state of the Oneida Lake canal and feeder. 5p. (Sen. doc. 1837, no. 16)

N. Y. (state)—Canals, Committee on. Report on petition of J. I. Cook and Timothy Jenkins for law authorizing purchase by the state of the Oneida Lake canal and feeder. 4p. (Sen. doc. 1837, no. 27)

Report on the petition of inhabitants of the counties of Oneida, Madison, Oswego and Onondaga, relative to the Oneida Lake canal and feeder. 6p. (Ass. doc. 1838, no. 252)

N. Y. (state)—Select committee. Report on navigation of Oneida river and lake by steam power. 2p. (Ass. doc. 1838, no. 202)

Report on petition praying that the Oneida river be made navigable for steamboats from Three River Point to Brewerton. 5p. (Ass. doc. 1838, no. 232)

Petition to the Legislature from the inhabitants of the counties of Oneida, Oswego, Madison and Onondaga who are interested in the navigation of the Oneida lake and river, Wood and Fish creeks and the Oneida Lake canal. 1p. n.p. 1838. 040 P v.223

N. Y. (state)—Canal commissioners. Report by O. W. Childs relative to Oneida river improvement, giving estimates and maps. 16p. (Ass. doc. 1839, no. 59)

N. Y. (state)—Canals, Committee on. Report on petition for the improvement of navigation on Oneida river. 3p. (Ass. doc. 1839, no. 182)

Report on petitions of inhabitants of Oneida, Oswego, Onondaga, and Madison counties, requesting state to purchase Oneida Lake canal and feeder. 3p. (Ass. doc. 1839, no. 33)

Oneida lake and river navigation. 1p. Constantia, 1839. 040 P v.223  
Being the *Messenger-extra-Utica*, Jan. 1839.

An act to authorize the canal commissioners to purchase, for the state, the Oneida Lake canal and feeder, passed May 11, 1840. (*see Laws of New York*)

N. Y. (state)—Canal commissioners. Report on the petition of inhabitants of the counties of Onondaga, Oneida, Oswego and Madison, for the purchase by the state of the Oneida Lake canal and feeder. 5p. O. (Ass. doc. 1840, no. 81)

N. Y. (state)—Canals, Committee on. Report on petition requesting state to purchase the Oneida Lake canal and feeder. 10p. (Ass. doc. 1840, no. 165)

N. Y. (state)—Canal board. Communication in relation to the Oneida Lake canal and feeder and the Seneca river towing-path. 2p. (Sen. doc. 1841, no. 76)

——— Report on Fish creek towing-path. 4p. (Ass. doc. 1845, no. 193)

Oneida lake improvement. (see Amer. R. R. jour. 1850, 23:295-96) 500 words.

620.5 qJ2

From the Oswego *Commercial times*. Advantages of route.

N. Y. (state)—Engineer and Surveyor. Report concerning petition for the removal of Caughdenoy dam, Oneida river. 4p. (Ass. doc. 1858, no. 121)

N. Y. (state)—Canal Department, Auditor of. Oneida Lake canal and locks. Neglected condition. (see Annual financial report for 1864, p.35-39; 1865, p.32-33) 386 N4261

N. Y. (state)—Executive department, Committee on expenditures of. Report relative to repairs on Oneida Lake canal. 1p. (Ass. doc. 1866, no. 60)

N. Y. (state)—Engineer and Surveyor. Report on survey of route for Oneida Lake canal. 4p. (Ass. doc. 1867, no. 73)

N. Y. (state)—Canal Department, Auditor of. Report relative to the Oneida Lake canal improvement, progress made, amounts expended, etc. 3p. (Ass. doc. 1872, no. 31)

N. Y. (state)—Canal Commissioners. Report on Oneida Lake canal. 5p. (Ass. doc. 1873, no. 38)

N. Y. (state)—Public Works, Superintendent of. Recommendation to abandon Oneida Lake canal. (see his annual report on canals for 1878, p.151) 386 N425

An act to provide for the disposition of the new Oneida Lake canal, passed May 23, 1887. (see Laws of New York)

### CHENANGO CANAL AND CHENANGO CANAL EXTENSION.

See also Annual reports, Material relating to history and construction of more than one canal, and other related headings.

N. Y. (state)—Canals, Committee on. Report relative to a canal from the Erie canal to the Susquehannah. (see Ass. jour. 1824, 47:1054)

An act authorizing the construction of a canal through the valley of the Chenango, to connect the waters of the Susquehannah with the Erie canal. 2p. (Ass. doc. 1826, no. 243)

Chenango canal. (see Alb. argus and gazette, Jan. 23, 1827) 2600 words. 071 xA11

Reasons for building it.

——— (see Alb. argus and gazette, Mar. 12, 1827) 1600 words. 071 xA11

Debate in the assembly on bill concerning its construction.

——— (see Alb. argus and gazette, Mar 22, 1827) 1500 words. 071 xA11

Communication on the cost of construction.

——— (see Alb. argus and gazette, Apr. 2, 1827) 900 words. 071 xA11

Communication on its probable revenue.

——— (see Alb. argus and gazette, Apr. 4, 1827) 800 words. 071 xA11

Editorial on Mr. Colden's speech in the Senate on the Chenango canal bill.

N. Y. (state)—Canals, Committee on. Report on petitions for canals from Binghamton to the Erie canal, upon three separate routes. (see Ass. jour. 1827, 50:565-67)

——— Report on the bill, entitled "an act authorizing the construction of a canal through the valley of the Chenango, to connect the waters of the Susquehannah with the Erie canal." (see Sen. jour. 1827, 1st sess. 50:490-505)

With documents, amendment suggested, p.576-77.

Robinson, Peter. Speech in the Assembly on Chenango canal bill. (see Alb. argus and gazette Mar. 15, 1827) 3200 words. 071 xA11

Waterman, T. G. Speech in the Senate on the bill authorizing the construction of the Chenango canal, delivered Apr. 9 and 10, 1827. 7p. O. Alb. 1827. 5200 words. 040 P v.145

Also in *Albany argus and gazette*, Apr. 16, 1827 (071 xA11).

- An act authorizing the construction of the Chenango canal. 2p. (Ass. doc. 1828, no. 98)
- N. Y. (state)—Canals, Committee on. Report on proposed amendment to the report relative to the proposed canal from the Susquehannah river at Binghamton to Erie canal. 12p. (Ass. doc. 1828, no. 93)
- Report relative to the construction of the Chenango canal. 10p. (Ass. doc. 1828, no. 92; or, Ass. jour. 1828, 51:515-32)
- Wright, Benjamin. Opinion on certain points in relation to the Chenango canal. 3p. (Ass. doc. 1828, no. 106)
- An act authorizing the construction of the Chenango canal, passed Mar. 24, 1829. (*see Laws of New York*)
- Also Ass. doc. 1829, no. 25.
- The canal. (*see Alb. daily advertiser*, Dec. 8, 1829) 800 words. N. Y. state lib.
- Reflections concerning estimated cost of construction.
- Chenango canal. (*see Alb. daily advertiser*, Feb. 24, 1829) 2800 words. N. Y. state lib.
- Speech of Mr. Starr in the Assembly on the bill authorizing the construction.
- Documents relative to the Chenango canal. (*see Ass. jour.* 1829, v.52, Appendix A)
- Report of N. S. Roberts, p.1-12. Report of Holmes Hutchinson, p. 12-17. Report of Benjamin Wright, p.18-20.
- N. Y. (state)—Canals, Committee on. Report on the petitions for the construction of the Chenango canal. 31p. (Ass. doc. 1829, no. 24; or, Ass. jour. 1829, 52:111-19)
- N. Y. (state)—Canal commissioners. Annual report on the Chenango canal. 42p. (Ass. doc. 1830, no. 47)
- N. Y. (state)—Canals, Committee on. Report on the report of the canal commissioners on the Chenango canal. 15p. (Ass. doc. 1830, no. 299)
- Tower, R. Appeal to the people of the state of New York in favor of the construction of the Chenango canal, with statements, documents, etc. 32p. O. Utica, 1830. 040 Pl v.20
- Also in volume of pamphlets (040 P v.145).
- Bates, David S. Copy of a letter, to J. A. Collier regarding the construction of Chenango canal. 5p. O. n.p. 1831. 040 P v.145
- Chenango canal. (*see Alb. daily advertiser*, Feb. 2, 1831) 3000 words. N. Y. state lib.
- Favorable report of Senate committee for its construction.
- (*see Alb. daily advertiser*, Mar. 11 and 12, 1831) 4400 and 400 words.
- N. Y. state lib.
- Parts of speeches of J. F. Hubbard in the Senate on the bill for its construction.
- Maynard, William H. Speech in the Senate, Feb. 23 and 24, 1831, on the bill for the construction of the Chenango canal. 56p. O. Alb. 1831. 040 P v.27
- N. Y. (state)—Canals, Committee on. Report in relation to Chenango canal. 9p. (Sen. doc. 1831, no. 20)
- Majority report relative to the Chenango canal. 7p. (Sen. doc. 1832, no. 16)
- Report relative to Chenango canal. 5p. (Ass. doc. 1832, no. 206)
- An act for the construction of the Chenango canal, passed Feb. 23, 1833. (*see Laws of New York*)
- N. Y. (state)—Canal commissioners. Communication relative to the Chenango canal. 2p. (Ass. doc. 1833, no. 220)
- N. Y. (state)—Canals, Committee on. Report on bill for the construction of the Chenango canal. 2p. (Sen. doc. 1833, no. 44)
- Report on petition for a canal from the Susquehannah at Binghamton, to the Erie canal. 17p. (Ass. doc. 1833, no. 26)
- An act to change the northern terminus of the Chenango canal, passed Mar. 24, 1834. (*see Laws of New York*)
- N. Y. (state)—Canal commissioners. Report on three petitions of inhabitants of Oneida county for termination of Chenango canal at Utica. 3p. (Ass. doc. 1834, no. 25)
- N. Y. (state)—Canal commissioners. Report relative to the route of the Chenango canal. 3p. (Sen. doc. 1834, no. 85)
- N. Y. (state)—Canals, Committee on. Report on petition to change the northern terminus of the Chenango canal. 7p. (Ass. doc. 1834, no. 83)

Petition of inhabitants of Madison and Oneida counties relative to Chenango canal. 5p. (Sen. doc. 1834, no. 61.)

N. Y. (state)—Select committee. Report on petition of the city of Utica for authority to raise money to defray expense of terminating the Chenango canal at said city. 3p. (Ass. doc. 1835, no. 368)

N. Y. (state)—Canals, Committee on. Report on petition of citizens of Utica for cancellation of bond executed by them for benefit of Chenango canal fund. 5p. (Ass. doc. 1836, no. 88)

N. Y. (state)—Canal commissioners. Report on petition of inhabitants of Sherburne for release from payment of certain moneys promised the state on condition Chenango canal should be located through said village. 3p. (Ass. doc. 1837, no. 211)

——— Report relative to amount of money agreed to be paid by individuals for changing termination of Chenango canal. 4p. (Sen. doc. 1837, no. 49)

——— Report relative to construction of Chenango canal. 4p. (Ass. doc. 1837, no. 201)

N. Y. (state)—Select committee. Report on petition of W. L. Crossett, and others, contractors on section two of northern division of Chenango canal, and the report of the canal commissioners on the same subject, also other accompanying documents. 100p. (Ass. doc. 1837, no. 315)

Includes Ass. doc. 1837, no. 317.

An act authorising a survey of a canal from Binghamton to the state line, passed Apr. 18. 1838. (see Laws of New York)

Chenango canal. (see Alb. daily argus, Sept. 25, 1838) 800 words.

071 xAll

Communication on its commercial advantages.

N. Y. (state)—Two-thirds bills, Committee on. Report on bill to cancel a bond of A. B. Johnson and others, given for termination of Chenango canal at Utica. 6p. (Ass. doc. 1838, no. 194)

N. Y. (state)—Ways and means, Committee on. Report on petition of citizens of Utica for cancellation of bond executed by them for benefit of the Chenango canal fund. 5p. (Ass. doc. 1838, no. 33)

N. Y. (state)—Canal commissioners. Report on extension of Chenango canal. 61p. (Ass. doc. 1839, no. 116)

——— Report on petition of M. Clarke and others concerning the location of the Chenango canal. 2p. (Ass. doc. 1839, no. 139)

N. Y. (state)—Canals, Committee on. Report on petitions for a canal from Chenango canal to state line, to connect with Penn. canal. 4p. (Ass. doc. 1839, no. 195)

N. Y. (state)—Ways and means, Committee on. Report on petition of inhabitants of Sherburne for release from payment of certain moneys promised the state on condition Chenango canal should be located through said town. 2p. (Ass. doc. 1839, no. 217)

N. Y. (state)—Canals, Committee on. Report on petitions for the extension of the Chenango canal from Binghamton to the state line, near Tioga Point. 5p. (Sen. doc. 1840, no. 71)

——— Report on petition of inhabitants of Oriskany Falls in relation to moneys paid by them on account of locating the Chenango canal through said village.

3p. Ass. doc. 1842, no. 69

3p. Ass. doc. 1843, no. 105

N. Y. (state)—Claims, Committee on. Adverse report on petition of inhabitants of Oriskany Falls for repayment of moneys advanced by them to secure location of the Chenango canal. 4p. (Ass. doc. 1844, no. 77)

Minority report on above, 4p. (Ass. doc. 1844, no. 82).

An act to incorporate the Chenango Junction canal company, passed May 12, 1846. (see Laws of New York)

Foots, John J. Chenango canal extension; speech in New York Senate, Mar. 11, 1859. 6p. O. 040 P v.477

Tioga county. Board of supervisors of. Report of a select committee on the extension of the Chenango canal, Nov. 26, 1859. 3p. O. 040 P v.1947

N. Y. (state)—Engineer and Surveyor. Report on extension of Chenango canal. 50p. (Sen. doc. 1860, no. 6)

Tioga county (N. Y.) citizens. Memorial in favor of the completion of the Chenango canal. 7p. O. Oswego, 1861. 040 P v.1247

N. Y. (state)—Canal commissioners. Report on cost of improvement of Chenango canal. 3p. (Ass. doc. 1864, no. 102)

N. Y. (state)—Canals, Committee on. Report relative to the cost of extending the Chenango canal, repairing locks thereon, etc. 2p. (Ass. doc. 1864, no. 155)

N. Y. (state)—Engineer and Surveyor. Report on extension of Chenango canal. 58p. (Sen. doc. 1864, no. 84)

Chenango canal extension. (see Amer. R. R. Jour. 1865, 38:99, 675) 140 words.

620.5 qJ2

Estimated cost more than was needed.

N. Y. (state)—Engineer and Surveyor. Report on expense of enlarging Chenango canal in the city of Utica to dimension of Erie canal, etc., with diagram. 2p. (Ass. doc. 1867, no. 171)

N. Y. (state)—Canal Department, Auditor of. Report concerning extension of Chenango canal. 3p. (Ass. doc. 1872, no. 90)

An act to provide for the disposition and sale of certain lateral canals of this state, and the lands, rights and other property connected therewith, passed June 4, 1877. (see Laws of New York)

An act to amend chap. 404, laws of 1877, entitled "an act to provide for the disposition and sale of certain lateral canals of this state, and the lands, rights and other property connected therewith," passed May 23, 1878. (see Laws of New York)

An act further to amend chap. 404, laws of 1877, relative to disposition and sale of certain lateral canals, etc. passed June 18, 1879. (see Laws of New York)

N. Y. (state)—Public Works, Superintendent of. Communication relative to the opening of the Chenango canal. 2p. (Sen. doc. 1879, no. 32)

An act to provide for the disposition of a portion of the Chenango canal and what is called and known as the Chenango canal extension, and the lands, rights and other property connected therewith, passed June 9, 1880. (see Laws of New York)

N. Y. (state)—Public works, Superintendent of. Report relative to sale of Chenango canal extension. 4p. (Ass. doc. 1880, no. 59)

An act to amend chap. 551 of laws of 1880, entitled "an act to provide for the disposition of a portion of the Chenango canal extension, and the lands, rights and other property connected therewith, passed June 13, 1881. (see Laws of New York)

An act for the disposition of certain portions of the Chenango canal not necessary for feeder purposes, passed May 21, 1883. (see Laws of New York)

An act to provide for the disposition of certain portions of the Chenango canal not necessary for future purposes, passed Apr. 4, 1884. (see Laws of New York)

An act to provide for the disposition of Woodman's pond and a portion of the Chenango canal and the lands, rights and other property connected therewith, passed May 28, 1884. (see Laws of New York)

The old Chenango canal, movement to rebuild revived. (see Utica Press, Feb. 8, 1905) 600 words.

Two articles, one an editorial.

### GENESEE VALLEY CANAL.

See also Annual reports, Material relating to history and construction of more than one canal, and other related headings.

Project of a canal from Rochester to the Allegheny river. (see Niles' register, 1825, 29:248) 100 words. 305 qN59

An act to provide for the survey of certain canal routes from the Allegheny river to the Erie canal and from thence to the St. Lawrence river. 1p. (Ass. doc. 1826, no. 268)

N. Y. (state)—Canals, Committee on. Report on petitions for canals from Erie canal to the Allegheny river, and from Erie canal to Ogdensburg on the river St. Lawrence. (see Ass. Jour. 1826, 49:1166-67)

U. S.—Roads and canals, Committee of. Report in favor of a survey for a canal route from Olean Point to Erie canal, Apr. 4, 1826. 4p. O. (U. S.—House—19th Cong. 1st Sess. Rep. 151)

Whipple, Charles T. Report of a survey of the Tonawanda canal route from the Allegheny river to the Erie canal, and a memorial by the committees of the people to the Legislature of New York in favor of its construction. 12p. O. n.p. 1826. 626



Bill entitled, "an act authorizing the continuation of Erie canal from Buffalo to the navigable waters of Allegheny river. 2p. (Ass. doc. 1827, no. 119)

Bill entitled "an act authorizing the construction of a canal through the valley of the Genesee to connect the waters of the Allegheny river with Erie canal." 2p. (Ass. doc. 1827, no. 120)

N. Y. (state)—Canals, Committee on. Report on petition of D. E. Evans and others, praying for the construction of a canal from the Erie canal by the way of the Tonawanda creek to the Allegheny river at Olean. (see Sen. jour. 1827, 1st sess. 50:170-82, 278-79)

Also in volume of pamphlets (040 P v.145) and in *Alb. argus and gazette*, Feb. 17, 1827, 8300 words (071 xAll)

——— Report on the Genesee and Conewango canals. 3p. (Ass. doc. 1827, no. 118; or, Ass. jour. 1827, 50:650-60)

——— Report on petitions for the continuation of the Erie canal through the valley of the Conewango river; also for a canal along the valley of the Genesee river to Olean Point; and from the Erie canal, by way of Tonawanda creek, to Olean Point. (Ass. doc. 1829, no. 164; or, Ass. jour. 1829, 52:721-22)

N. Y. (state)—Legislature. Concurrent resolutions for the survey of the three proposed routes of a canal from the Erie canal to Allegheny river, passed Mar. 17, 1829. (see Laws of New York)

An act directing the survey of a canal route from Rochester to Allegheny, passed Apr. 17, 1830. (see Laws of New York)

An act authorizing the survey of a canal route from Rochester to Olean, also a side-cut from Dansville to the aforesaid canal near Mount Morris, passed Apr. 30, 1834. (see Laws of New York)

Appeal to the people of the state of New York and their representatives in the Legislature, in favor of constructing the Genesee and Allegheny canal. (see Amer. R. R. jour. 1834, 3:3-4, 52-53, 68-69, 82-84) 10,000 words. 620.5 qJ3

Proposed canal. (see Alb. daily advertiser, Dec. 16, 1834) 1900 words. N. Y. state lib.  
From Erie canal at Rochester to the Allegheny river at Olean.

Mills, Frederick C. Report to the canal commissioners of his survey of the route for the Rochester and Olean canal. (see Amer. R. R. jour. 1835, 4:91-93, 107-9, 114-17, 122-25) 18,000 words. 620.5 qJ2

N. Y. (state)—Canal commissioners. Report relative to survey of canal route from Rochester to Olean. 176p. (Ass. doc. 1835, no. 264; or, Sen. doc. 1836, no. 42)

N. Y. (state)—Canals, Committee on. Report on petitions for immediate construction of canal from Rochester to Olean. 6p. (Sen. doc. 1835, no. 78)

An act to provide for the construction of the Genesee Valley canal, passed May 6, 1836. (see Laws of New York)

N. Y. (state)—Select committee. Report on petition for construction of canal from Rochester to Olean. 5p. (Ass. doc. 1836, no. 140)

Genesee Valley canal. (see Alb. daily argus, Aug. 8, 1838) 700 words. 071 xAll  
Communication describing the route.

——— (see Alb. evening jour. Apr. 16, 1839) 2900 words. N. Y. state lib.  
Report of canal commissioners in response to legislative request.

Joint committee and the Genesee Valley canal engineers. (see Alb. daily argus, Feb. 7, 1839) 1600 words. 071 xAll

Critical review from *Livingston register*.

N. Y. (state)—Canal board. Alteration of plan to lessen cost of Genesee Valley canal. 12p. (Ass. doc. 1839, no. 376)

Includes letter from F. C. Mills, chief engineer, Apr. 12, 1839.

N. Y. (state)—Canals, Committee on. Report on petition of inhabitants of Allegany county for navigable feeder from Genesee Valley canal to Genesee river. 2p. (Ass. doc. 1839, no. 260)

——— Report on petition of inhabitants of Dansville for a side-cut from the Dansville branch of the Genesee Valley canal to said village. 3p. (Ass. doc. 1839, no. 296)

——— Report on petitions for change of location of part of Genesee Valley canal. 3p. (Ass. doc. 1839, no. 176)

——— Report on petitions of inhabitants of Genesee, for junction canal to connect Genesee river with Genesee Valley canal. 3p. (Ass. doc. 1839, no. 264)

N. Y. (state)—Select committee. Report on petitions for substitution of a railroad for a portion of the Genesee Valley canal. 9p. (Ass. doc. 1841, no. 199)

N. Y. (state)—Canal commissioners. Report on mechanical structures, Genesee Valley canal. 7p. (Sen. doc. 1843, no. 77)

——— Report of acting commissioner in charge on cost of completion, etc., Genesee Valley canal. 6p. (Sen. doc. 1844, no. 111)

——— Report on estimating for completion of Genesee Valley canal. 9p. (Sen. doc. 1844, no. 112)

N. Y. (state)—Canals, Committee on. Report on application of Frederick House and others for permission to connect slip and basin with Dansville branch of Genesee Valley canal. 20p. (Ass. doc. 1844, no. 164)

Affidavits in relation to same, 19p. (Ass. doc. 1844, no. 182); 8 p. (Ass. doc. 1844, no. 187).

N. Y. (state)—Senate. Preamble and resolution offered by C. T. Chamberlain, relative to completion of Genesee Valley canal. 2p. (Sen. doc. 1844, no. 45)

N. Y. (state)—Canal board. Report on change of plan in construction of locks on Genesee Valley canal. 6p. (Ass. doc. 1845, no. 202)

N. Y. (state)—Canal commissioners. Report on bill authorizing connection of slip and basin with Dansville side-cut of Genesee Valley canal. 9p. (Ass. doc. 1845, no. 135)

——— Report on preservation of unfinished work on Genesee Valley canal. 7p. (Ass. doc. 1845, no. 154)

——— Report on survey, etc., of Mill creek reservoir for Genesee Valley canal. 6p. (Sen. doc. 1845, no. 75)

N. Y. (state)—Canals, Committee on. Report on bill authorizing Charles Shepard and others to connect slip and basin with Dansville side-cut of Genesee Valley canal. 9p. (Sen. doc. 1845, no. 96)

——— Report on petition of Charles Shepard and others for permission to connect slip and basin with Dansville side-cut of Genesee Valley canal. 7p. (Ass. doc. 1845, no. 117)

——— Report on restoration of berme bank of canal at Dansville. 2p. (Sen. doc. 1845, no. 82)

N. Y. (state)—Canal commissioners. Report on probable cost of completing Genesee Valley canal from Shaker settlement to Canadaca feeder. 5p. (Sen. doc. 1848, no. 58)

Marsh, Daniel and Silas Cornell. Report of a survey of the Genesee Valley canal, made Sept., 1854. 8p. O. Rochester, 1855. 040 P v.230

N. Y. (state)—Canals, Committee on. Report on extension of Genesee Valley canal. 3p. (Ass. doc. 1856, no. 160)

An act to extend the Genesee Valley canal to Millgrove pond, passed Apr. 3, 1857. (see Laws of New York)

N. Y. (state)—Canal commissioners. Report, in conjunction with State Engineer, on extension of Genesee Valley canal. 16p. map. (Ass. doc. 1857, no. 35)

N. Y. (state)—Canals, Committee on. Report on extension Genesee Valley canal. 11p. (Sen. doc. 1857, no. 53)

N. Y. (state)—Engineer and Surveyor. Report on extension of Genesee Valley canal. 5p. (Sen. docs. 1857, no. 103, or, 114)

N. Y. (state)—Canal board. Report on Genesee Valley canal. 2p. (Ass. doc. 1864, no. 163)

N. Y. (state)—Commissioners. Report on investigation as to causes of inundation of Rochester in March, 1865. 26p. maps. (Ass. doc. 1866, no. 117)

N. Y. (state)—Engineer and Surveyor. Report on state of completion Genesee Valley canal. 5p. (Ass. doc. 1871, no. 86)

An act further to amend chap. 404, laws of 1877, entitled "an act to provide for the disposition and sale of certain lateral canals of this state, and the lands, rights and other property connected therewith," passed June 18, 1879. (see Laws of New York)

An act relating to the banks and prism of the Genesee Valley canal, and for the sale thereof, passed May 19, 1880. (see Laws of New York)

An act to authorize the removal of the water from the Genesee Valley canal, across the Genesee river into the Genesee river feeder, passed July 25, 1881. (see Laws of New York)

An act to release the right, title and interest of the state of New York in certain portions of the Genesee Valley canal, passed May 16, 1882. (see Laws of New York)

N. Y. (state)—State Engineer and Surveyor. Report on change in channel of Griffith's creek, with map. 2p. (Ass. doc. 1882, no. 17)

Peck, William F. The Genesee Valley canal. (see *His History of the city of Rochester*. 1884 p.237) 974.789 qP33

Kuichling, Emil. Report on improvement of a portion of the former Genesee Valley canal, with map. (see N. Y. (state)—Health Board of. Report for 1889, 10:237-44)

614.09747 O0

### DELAWARE AND HUDSON CANAL.

See also Annual reports, Articles on construction and history of more than one canal and other related headings.

Laws of the state of New York and Pennsylvania relating to the Delaware and Hudson canal company, 1822-99. 109p. O. N.Y. n.d.

The copy inspected was in the possession of the Delaware and Hudson canal company.

Delaware and Hudson canal company. Annual report of the board of managers to the stockholders for 1831-56 and 1877. O. N. Y. 1832-57 and 1878. 386 D37  
Wanting: Report for 1833.

for 1825-73. O. N. Y. 1826-74.

386 D371

Reprints: Wanting: Reports for 1828, '28-30 and '33. Annual report of 1842 is also in *Hasard's United States commercial and statistical register*, 1842, 6:175 (305 qH33). Annual reports of 1849 and 1858, respectively, are also in volumes of pamphlets (040 P v.145 and 953). Extracts of reports of current year are in *American railroad journal*, 1842, 14: 249-51; 1845, 18: 253; 1847, 20:373-76; 1850, 23: 214-15; 1858, 31:249; 1859, 32: 249, 267-68; 1861, 34: 281-82; 1862, 35: 270; 1866, 39:557; 1871, 44: 538; 1872, 45:790; 1877, 50: 298; 1878, 51: 551 (620.5 qJ2).

Report for 1828 is in a volume of pamphlets (040 P v.1947).

An act to incorporate the president, managers and company of the Delaware and Hudson canal company, passed April 23, 1823. 8p. (Sen. doc. 1823, no. 222)  
Also in *Laws of New York*.

An act granting banking privileges to the Delaware and Hudson canal company. (see Ass. jour. 1824, 47:1269-70)

An act to amend the act, entitled "an act to incorporate the . . Delaware and Hudson canal company," passed Apr. 7, 1824. 3p. (Ass. doc. Mar. 18, 1824)  
Also in *Laws of New York*.

Memorial of Maurice Wurts, of the city of Philadelphia, concerning the Delaware and Hudson canal company. 3p. (Sen. doc. 1824, no. 134)

N. Y. (state)—Canals, Committee on. Report on memorial of Maurice Wurts of Philadelphia, relative to Delaware and Hudson canal. (see Sen. jour. 1824, 47:284-85)

N. Y. (state)—Select committee. Report concerning the memorial of Maurice Wurts in relation to the Delaware and Hudson canal company. 2p. (Sen. doc. 1824, no. 153)

Report on petition of inhabitants of Orange county, in relation to a canal, to unite the waters of the Delaware and Hudson rivers. 3p. (Ass doc. 1824, no. 150)

Wright, Benjamin and J. L. Sullivan. Report of the survey of the route of the proposed canal from the Hudson to the headwaters of the Lackawaxen river, accompanied by other documents, etc. 70p. illus. map, O. Phil. 1824. o40 P1 v.5

Followed by explanations of the principles of the composite lock and of the vertical lift, referred to in report of J. L. Sullivan; also the act to incorporate the Delaware and Hudson canal company.

An act, explanatory of the act incorporating the Delaware and Hudson canal company, and of the several acts amendatory thereof, passed Apr. 20. 2p. (Sen. doc. 1825, no. 215)  
Also in *Laws of New York*.

Delaware and Hudson canal. (see Niles' register, Aug. 6, 1825, 28:356-57) 1200 words. 305 qN59

Ceremony at its commencement; including extracts of the address by Mr. Hone.

Petition, Delaware and Hudson canal company for an act amending their incorporating act. 2p. (Sen. doc. 1825, no. 214)

Mills, John B. Survey for a proposed canal along the Delaware river from the mouth of the Lackawaxen river to the village of Deposit, Oct. and Nov. 1826. 16p. O. Alb. 1827. 626

Wright, Benjamin. A survey for a proposed canal along the Delaware river from the mouth of the Lackawaxen river to the village of Deposit. O. 1826.

Manuscript notes bound. In possession of Delaware and Hudson canal company.

An act to loan the credit of the state to the Delaware and Hudson canal company, passed Mar. 10, 1827. (*see Laws of New York*)

For bills, *see Sen. doc.* 1827, no. 62 and 67.

Delaware and Hudson canal company. Considerations in support of the memorial. 16p. O. Alb. 1827. 040 P v.145

— Memorial. 3p. (*Sen. doc.* Jan. 20, 1827)

The Hudson and Delaware canal company. (*see Alb. argus and gazette*) 071 xAl1  
Feb. 21, 1827 1200 words.

Feb. 28, 1827 300 words.

N. Y. (state)—Canals, Committee on. Report on the memorial of the Delaware and Hudson canal company for relief. (*Sen. doc.* 1827, no. 61; or, *Sen. jour.* 1827, 1st sess. 50:117-22)

Delaware and Hudson canal. (*see Niles register*, 1828-29, 35:130, 433) 800 words.

305 qn59

From the *Albany argus*.

Completion of the canal; its description and prospective importance.

Delaware and Hudson canal company. Third general report to stockholders, Mar. 4, 1828. 22p. O. N. Y. 1828. 040 P v.1947

Hone, Philip. Communication announcing the completion of the Delaware and Hudson canal. (*see Sen. jour.* 1828, 2d sess. 51:40-41)

An act to loan the credit of the state to the Delaware and Hudson canal company, passed May 2. 2p. (*Ass. doc.* 1829, no. 109)

Also in *Laws of New York*.

Delaware and Hudson canal company. Memorial for additional state aid. 4p. (*Ass. doc.* 1829, no. 17)

— Papers in relation to the application of the company for legislative aid, Jan. 26, 1829. 26p. O. n.p. 1829. 386 D37

N. Y. (state)—Comptroller. Report relative to additional aid to the Delaware and Hudson canal company. 11p. (*Ass. doc.* 1829, no. 41; or, *Ass. jour.* 1829, 52:211-20)

N. Y. (state)—Select committee. Report on memorial of Delaware and Hudson canal company, praying a loan of the credit of the state for \$500,000. (*Ass. doc.* 1829, no. 108; or, *Ass. jour.* 1829, 52:519-27)

Monopoly is tyranny; or, an appeal to the people and Legislature from the oppression of the Delaware and Hudson canal company. 28p. O. Dundaff, 1830. 040 P v.145

N. Y. (state)—Comptroller. Report on memorial of the Delaware and Hudson canal company. 3p. and 2p. (*Sen. doc.* 1830, no. 198 and 317)

Latter report corrects statement in former one.

— Report on the petition of the Delaware and Hudson canal company. 4p. (*Sen. doc.* 1830, no. 21)

Exposition of the objects and views of the Delaware and Hudson canal company in a letter to John Bolton, president of the company. 7p. O. n.p. 1831. 040 P v.1947  
Signed "Investigator."

Letter from the president of the Delaware and Hudson canal company on the progress made. 3p. (*Sen. doc.* 1831, no. 2 and 4)

Views of a stockholder in relation to the Delaware and Hudson canal company. Jan. 1831. 24p. O. 040 P v.1947

Delaware and Hudson canal. (*see Amer. R. R. jour.* 1832, 1:357) 620.5 qJ2  
Influence on development and growth of adjacent country, especially Roundout.

N. Y. (state)—Judiciary, Committee on. Report on petition of inhabitants of Orange and Sullivan counties for relief for injuries sustained from Hudson and Delaware canal. 3p. (*Sen. doc.* 1834, no. 77)

N. Y. (state)—Banks and insurance companies, Committee on. Report relative to issue of notes by Delaware and Hudson canal company. 14p. (*Sen. doc.* 1839, no. 49)

Delaware and Hudson canal and railroad. (*see Niles' register*, 1841, 61:202) 600 words.  
305 qN59

From *Harrisburg chronicle*.

Also in part in *U. S. commercial and statistical register*, Sept. 1841, 5:164.

Facts about its history and present valuation.

Delaware and Hudson canal company. Letter from its president to the Governor reporting its condition. p.193-5. (Ass. doc. 1842, no. 2)

Delaware and Hudson canal company. (see Amer. R. R. jour. 1842, 14:32-38) 1800 words  
620.5 J2

An endeavor to elucidate the reports of 1840 and 1841, on account of the variance of opinion as to its safety as an investment, and the security of its debt to the state of New York.

N. Y. (state)—Comptroller. Letter to the president of the Delaware and Hudson canal company and reply. p.5-7. (Ass. doc. 1842, no. 162)

Delaware and Hudson canal. (see Fisher's national mag. 1845, 1:216-22) 3200 words.  
305 F53

Historical sketch.

N. Y. (state)—Comptroller. Report on indebtedness of the Delaware and Hudson canal company to the state. 3p. (Ass. doc. 1845, no. 155)

N. Y. (state)—Finance, Committee on. Report on memorial of the Delaware and Hudson canal company praying for restitution from the state of the sum of \$50,000. 7p. (Sen. doc. 1848, no. 43)

N. Y. (state)—Comptroller. Report as to state stocks issued to Delaware and Hudson canal company, 1p. (Sen. doc. 1849, no. 41)

Delaware and Hudson canal company. Memorial to the Legislature. Mar. 1852. 16p. O.  
N. Y. 1852. 386 D37

N. Y. (state)—Select committee. Report of majority on violation of charter by the Delaware and Hudson canal company. 7p. (Ass. doc. 1852, no. 60)  
Report of minority on above, 15p. (Ass. doc. 1852, no. 70.)

Delaware and Hudson canal company. (see Amer. R. R. jour. 1864, 37:652, 1275)  
620.5 qJ2

Apportionment of 12,500 shares of new stock.

—— (see Amer. R. R. jour. 1868, 41:455) 200 words. 620.5 qJ3  
Company proposes to double its capital stock.

Delaware and Hudson canal company. Report to the stockholders by the committee appointed at the annual meeting, held on May 8, 1877. 104p. 1 map, O. N. Y. 1877. 386 D372

Delaware and Hudson canal company. Communication tariff from Albany and Troy. 3p. O.  
1878? 656

Ringwalt, John Luther. Cost of transportation on the Delaware and Hudson canal. (see His Development of transportation systems in the U. S. 1888. p.48) 385 qR47  
Early history.

Abandonment of old waterway considered. (see Eng. news, 1898, 40:296) 620.5 fN4

Break in the Delaware and Hudson canal. (see Eng. rec. 1888, 18:158) 50 words.  
620.5 qN7

Decadence of the canal. (see Bradstreet's, 1898, 26:742) 150 words. 330.5 fB72

### JUNCTION CANAL—(Chemung and Chenango).

See also Annual; reports, Articles on construction and history of more than one canal, Chemung canal and other related headings.

An act authorizing a survey of a canal from the termination of the Chemung canal to the state line, passed May 1, 1839. (see Laws of New York)

N. Y. (state)—Governor. Message. (Ass. jour. 1839, 62:922)

Announcement that a committee of the Pennsylvania Senate has come to discuss connection between north branch of the Pennsylvania canal and the Chenango and Chemung canals.

N. Y. (state)—Joint select committee. Report in relation to a proposed connection of public works of the states of New York and Pennsylvania. 9p. (Sen. doc. 1839, no. 112)  
Includes letter from the delegation of the Pennsylvania Senate, dated Apr. 12, 1839. .

Pa.—Legislature. Communication from the committee to Governor of New York in relation to connecting the North Branch of the Pennsylvania canal with the Chemung or Chenango canals of New York. 1p. (Sen. doc. 1839, no. 86, or, Ass. doc. 1839, no. 359)

Pa.—Senate, Select committee of. Report of the select committee appointed to confer with the authorities of the state of New York relative to a connection of the public works of New York and Pennsylvania, read in Senate, May 15, 1839. 15p. O. Harrisburg, 1839. 386

Union of the Chemung and North Branch canals: New York and Erie railroad. 59½ x 15 cm.  
 Elmira, 1839. 040 P v.223

Reprint from *Elmira republican*, extra, Jan. 26, 1839.

N. Y. (state)—Canal commissioners. Report on survey of canal from the termination of the Chemung canal to the state line. 57p. (Ass. doc. 1840, no. 32.) 626 H7  
 Includes the report of the engineer, J. D. Allen.

N. Y. (state)—Canals, Committee on. Report on the petitions for the extension of the Chemung canal, to the Pennsylvania state line. 3p. (Ass. doc. 1840, no. 287)

Extension of the Chenango and Chemung canals to a junction with the state canals of Pennsylvania. (see Fisher's national mag. 1845 1:369-71) 1200 words. 305 F53

An act to incorporate the Junction canal company, passed May 11, 1846. (see Laws of New York)

From Chemung canal.

An act, passed Apr. 15, 1853, to amend the act entitled "an act to incorporate the Junction canal company," passed May 11, 1846. (see Laws of New York)

An act to renew the corporate powers of the Junction canal company, passed Apr. 16, 1852 (see Laws of New York)

An act to authorize the connection between the Junction canal and the Chemung canal, and to regulate the same, passed Apr. 15, 1854. (see Laws of New York)

### BUFFALO AND BLACK ROCK HARBORS AND BASINS.

See also Annual reports, Articles on construction and history of more than one canal, Erie canal, Terminal charges, Commerce and navigation, and other related headings.

U. S.—Engineer department. Annual report of the chief of engineers, 1866-date. 627 I2  
 Analytical and topical index for 1866-1900.

An act relating to the harbor of Buffalo creek, passed Apr. 10, 1818. (see Laws of New York)

An act to authorize the construction of a harbor at the mouth of Buffalo creek, on Lake Erie, passed Apr. 7, 1819. (see Laws of New York)

Thomas, David. Report to the canal commissioners relative to Buffalo harbor. p.17-26.  
 (Ass. doc. 1820, no. 108) 040 P v.223

See also Ass. jour. 1820, 43: 545-49 and *Public documents* compiled by C: G. Haines, p.421-29 (386 H 12).

Plan of harbor at the east end of Lake Erie. (see Watson, Elkanah. History of the western canals, 1788-1819. 1820. p.102-4) 386 W33

Buffalo harbor. (see Alb. daily advertiser, Dec. 19, 1821) 1200 words. N. Y. state lib.  
 From *Batavia advocate*. A description.

An act to authorize and encourage the construction of harbors at Buffalo creek and Black Rock, passed Apr. 17, 1822. (see Laws of New York)

Black Rock harbor company. Documents relating to the western termination of the Erie canal by David Thomas, James Geddes and others, with explanations and remarks; reply to pamphlet written by General Porter. 59p. O. Black Rock, 1822. 626  
 Also published by Buffalo harbor committee, 1823 (386).

N. Y.(state)—Canal commissioner. Report on "an act to authorize and encourage the construction of harbors at Buffalo and Black Rock. (see Ass. jour. 1822, 45:861)

N. Y. (state)—Canals, Committee on. Report on the memorial of P: B. Porter, on behalf of the Black Rock harbor company, and the remonstrance of Samuel Wilkeson against the same. (see Ass. jour. 1823, 46:642)

An act to amend an act entitled "an act to authorize and encourage the construction of harbors at Buffalo and Black Rock," passed Mar. 31, 1823. (see Laws of New York)

Black Rock and Buffalo. (see Alb. daily advertiser, July 22, 1823) 1200 words.

N. Y. state lib.

Commending construction of harbor at Black Rock.

N. Y. (state)—Canal commissioners. Report relative to the construction of a harbor at Black Rock. 2p. (Ass. doc. 1823, no. 167; or Ass. jour. 1823, 46:727)

Porter, Peter B. Memorial in behalf of the Black Rock harbor company, praying authority to construct harbors at Buffalo and Black Rock. 2p. (Ass. doc. 1823, no. 143)

Wilkeson, Samuel. Memorial on the subject of the Black Rock and Buffalo harbors. 4p (Ass. doc. 1823, no. 141)

Black Rock harbor. (see Alb. daily advertiser, Nov. 17, 1824) 1500 words.

N. Y. state lib.

From *Buffalo journal*.

Examination of causes producing injury to piers.

Black Rock harbor. (see Alb. daily advertiser, Nov. 24, 1824) 3100 words.

N. Y. state lib.

Signed "A citizen of Black Rock."

Historical review of the controversy over causes for injuries to piers, etc.

Documents accompanying the report of the standing committee on canals and internal improvements, in relation to the Western terminus of the Erie canal. 30p. F. (see Ass. jour. 1824, v.47, Appendix D)

*Contents:* Views of De Witt Clinton, p.1-6; letter from Joseph Ellicott, p.6-7; statements from W. C. Bouck and Myron Holley, in behalf of the canal commissioners, p.8-23; report of Surveyor-General on state lands at Black Rock, p.25-26; report by D. S. Bates on survey along Niagara river, p.27-29; opinions of Benjamin Wright and Canvass White, p.29-30.

N. Y. (state)—Canals, Committee on. Report on the bill relative to the harbor at the western termination of the canal. (see Ass. jour. 1824, 47:839-41)

Black Rock harbor. (see Alb. daily advertiser, June 5, 1826) 700 words. N. Y. state lib.

From *Buffalo patriot*.

Account of partial collapse of pier.

N. Y. (state)—Canal commissioners. Report on petition of Black Rock harbor company relative to proper amount to be paid for the construction of the harbor. (Ass. doc. Jan. 30, 1826; or, Ass. jour. 1826, 49:400-1)

Report on petition of inhabitants of Buffalo, praying an appropriation of \$15,000 for repairs to Buffalo harbor. (Ass. doc. 1826, no. 71; or, Ass. jour. 1826, 49:399-400)

N. Y. (state)—Canals, Committee on. Report on memorial of Augustus Porter and others in behalf of the Black Rock harbor company. (see Ass. jour. 1826, 49:517-19)

Report on the petition of the Black Rock harbor company relative to the powers of the canal commissioners on the subject. (see Sen. jour. 1826, 49:297)

Report respecting the harbor at Buffalo creek. (see Ass. jour. 1826, 49:792-93)

Bill entitled "an act relative to Black Rock harbor, etc.," 1p. (Sen. doc. 1827, no. 84)

An act relative to the harbors of Buffalo and Black Rock. 1p. (Ass. doc. 1828, no. 212)

Black Rock harbor. (see Alb. daily advertiser, Jan. 4, 1828) 800 words. N. Y. state lib.

Signed "Plain Truth." Writer calls for the abandonment of the harbor.

(see Alb. daily advertiser, Jan. 5, 1828) 900 words.

N. Y. state lib.

Signed "Justice." Concerning injuries to piers.

(see Alb. daily advertiser, Jan. 26, 1828) 1600 words.

N. Y. state lib.

Signed "Plain Truth." Value to canal.

Black Rock harbor company. Memorial to the canal commissioners stating grounds on which they declined to repair a breach in the harbor. (Ass. doc. 1828, no. 28. p.1-8)

Plans and propositions for the construction of a harbour at Black Rock. (Ass. doc. 1828, no. 28, p.9-10)

Buffalo and Black Rock harbors. (see Alb. daily advertiser, Feb. 9, 1828) 1600 words.

N. Y. state lib.

Signed "A western citizen." Concerning the condition of the harbors.

Buffalo harbor. (see Alb. daily advertiser, Oct. 11, 1828) 500 words. N. Y. state lib.

From *Buffalo journal*. Description of works being constructed by United States.

N. Y. (state)—Canal board. Report on that part of the Governor's message relating to the western termination of the Erie canal, also the memorial and resolution of the Black Rock harbor company. (see Ass. jour. 1828, 51:770-73)

Report relative to Buffalo and Black Rock harbors. 4p. (Ass. doc. 1828, no. 175)

Report on memorials of Black Rock land and railroad company and inhabitants of Buffalo relative to Black Rock harbor. 4p. (Ass. doc. 1836, no. 115)

An act for the construction of the Main and Hamburg street canal in Buffalo, passed Mar. 27, 1838. (see Laws of New York)

N. Y. (state)—Legislature. Concurrent resolutions directing the survey of the Main and Hamburg street canal of Buffalo, passed Apr. 19 and 23, 1839. (see Laws of New York)

N. Y. (state)—Canal commissioners. Report relative to proposed basin at Buffalo. 4p. (Ass. doc. 1839, no. 363)

N. Y. (state)—Canal board. Report in relation to the occupancy of the pier of Black Rock harbor. 2p. (Ass. doc. 1840, no. 313)

N. Y. (state)—Canal commissioners. Report in relation to the survey of the Main and Ham-burgh street canal, in Buffalo. 6p. (Ass. doc. 1840, no. 257)

Erie canal at Buffalo. (*see* Amer. R. R. jour. 1847, 20:534) 700 words. 620.5 qJ2  
From the *Buffalo courier*. Plan for better accommodation for the business of the lake and canal.

N. Y. (state)—Canal board. Report in relation to the Ham-burgh canal in Buffalo and a bridge across the Chemung canal in Elmira. 6p. (Ass. doc. 1847, no. 152)

— Report on memorials for enlargement of canal basin at Buffalo. 14p. (Ass. doc. 1847, no. 205)

— Report on removal of bar from foot of Squaw Island to main shore below Black Rock dam. 2p. (Ass. doc. 1847, no. 213)

N. Y. (state)—Judiciary, Committee on. Report relative to the petition of Edward Pierson for a floating dry dock at Buffalo. 2p. (Ass. doc. 1847, no. 63)

Report in relation to the increase of harbor facilities at the city of Buffalo, approved at a general meeting, Aug. 21, 1847. 54p, map, O. Buffalo, 1847. 627

N. Y. (state)—Canal board. Report on memorial of the Niagara river hydraulic company relative to the improvements at Squaw Island, Buffalo harbor. 2p. (Sen. doc. 1848, no. 57)

U. S.—Topographical engineers. Buffalo harbor; letter from the secretary of war relative to the different plans for the improvement of Buffalo harbor, Dec. 18, 1848. 19p. illus. map. O. (U. S.—House—30th Cong. 2d Sess. Ex. doc. 23) 040 Pl v.50

N. Y. (state)—Canal board. Report on contracts for work on proposed basins, Buffalo. 4p. (Sen. doc. 1849, no. 26)

— Report on improvement of Black Rock harbor.

8p. (Sen. doc. 1849, no. 33)

4p. (Ass. doc. 1851, no. 90)

N. Y. (state)—Canals, Committee on. Report on payment of contractors for Erie basin and slips, Buffalo. 2p. (Sen. doc. 1859, no. 75)

2p. (Sen. doc. 1860, no. 25)

N. Y. (state)—Canal board. Proceedings relative to Clark and Skinner slip, Buffalo. 6p. (Sen. doc. 1863, no. 16)

N. Y. (state)—Canals, Committee on. Report relative to overflowed lands at Black Rock harbor. 1p. (Ass. doc. 1863, no. 153)

Hosmer, Rev. George W. Rivalry of Buffalo and Black Rock for the terminus of the Erie canal, and the advance of Buffalo. (*see* Buffalo historical society. Publications. 2:8-16, 147-48) 974.797 B86

In *Annual address*, 1864, and *Memorial address*, Oliver Gray Steele.

Barton, James L. Influence of completion of Erie canal on Buffalo. (*see* Buffalo historical society. Publications. 1879. 1:170-71) 974.797 B86  
In *Early reminiscences of Buffalo and vicinity*, read before the society, Mar. 19, 1866.

U. S.—Engineer department. Annual report, 1866 to date. 627 I2

Scattered references. For 1866-1900 there is a consolidated analytical and topical index.

N. Y. (state)—Canal commissioners. Report on depth of water, etc. in Ohio basin, Buffalo. 3p. Map. (Sen. doc. 1868, no. 31)

— Report on construction of docks by private parties, Erie basin, Buffalo.

10p. Sen. doc. 1869, no. 15.

9p. Ass. doc. 1870, no. 85.

Sheldon, James. Rivalry of Black Rock and Buffalo for the terminus of the Erie canal, also celebration over the completion of the canal. (*see* Buffalo historical society. Publications, 1879, 1:378-86) 379.797 B86

In *Life and public services of Oliver Forward*, read before the society Jan. 25, 1875.

Lord, Rev. John C. Samuel Wilkeson and his connection with the early history of Buffalo harbor and the Erie canal. (*see* Buffalo historical society. Publications, 1896, 4:77-79) 974.797 B86

From a paper read before the society in 1871.



Symons, Thomas W. Report on survey and estimate of cost of improvement of the Buffalo entrance to Erie basin and Black Rock harbor. (see U. S.—Engineer department. Annual report for 1897, p.3246-50) 626.9 P7

U. S.—House-55th Cong. 2d Sess. Doc. 2, pt.4.

An act to authorise the abandonment of the Main and Hamburg street canal in the city of Buffalo, the abatement of the nuisance created thereby, and vesting the title and ownership to the lands and premises included therein in said city, passed Apr. 19, 1898. (see Laws of New York)

Low, Emile. The new stone breakwater at Buffalo, N. Y. (see Eng. news, May 16, 1901, 45:346-52) 5000 words. 620.5 fN4

Fully illustrated.

— The materials for the concrete of the Buffalo breakwater. (see Eng. news, 1902, 48:182-84) 2800 words. 620.5 fN4

Symons, Thomas W. Concrete breakwater construction at Buffalo, New York. (see Eng. news, May 29, 1902, 47:426-32) 7000 words. 620.5 fN4

Symons, Thomas W. and J. C. Quintus. History of Buffalo harbor, its construction and improvement during the nineteenth century. (see Buffalo historical society. Publications, 1902, 5:239-85) 974.797 B86

Wilkeson, Samuel, jr. Beginning of Buffalo harbor. (see Buffalo historical society. Publications, 1902, 5:185-214) 974.797 B86

— Samuel Wilkeson and his connection with the early history of Buffalo harbor and the Erie canal. (see Buffalo historical society. Publications, 1902, 5:135-37, 140-42) 974.797 B86

From a biographical sketch.

The accident to the Buffalo breakwater. (see Eng. news, Mar. 19, 1903, 49:250) 600 words. 620.5 fN4

Illustrated account of the serious settlement that occurred Dec. 10, 1902, describing the proposed method of repairing.

The Buffalo breakwater system. (see Eng. rec. Apr. 4, 1903, 47:343-46) 4400 words. 620.5 fN7

Brief history of Buffalo harbor, with illustrated detailed description of the latest work.

Final completion of the Buffalo breakwater extension to Stony Point. (see Eng. news, Oct. 1, 1903, 50:281) 350 words. 620.5 fN4

Illustrations of what is claimed to be the longest breakwater system in the world, with facts concerning it.

Low, Emile. The development of Buffalo harbor. (see R. R. gas. Mar. 13, 1903, 35:186-88) 385 fR132

From a paper read before the R. R. branch of the Young Men's Christian Association.

Briefly reviews previous work and gives an illustrated account of the breakwater system in process of construction which will make this one of the finest harbors.

— Some methods and costs of concrete mixing on the Buffalo breakwater. Illustrated. (see Eng. news, 1903, 50:312-14) 2500 words. 620.5 fN4

The new Buffalo breakwater; illustrations and particulars of the work. (see Sci. Amer. Apr. 4, 1903, 102:244-45) 1200 words. 605 fK5

Low, Emile. Breakwater at Buffalo, N. Y. (see Amer. soc. civ. eng. Transactions, 1904, 52:73-197) 36,400 words. 620.6 N2

Followed with a discussion by Thomas D. Pitts, William T. Lyle, D. E. Hughes, G. H. Raymond, George E. Fall, p.198-214, 3000 words.

Also in *Proceedings* of the society, Nov. 1903 and Jan. and Mar. 1904 (620.6 N 6).

Illustrated detailed description of breakwater construction and extension, with a history of the projects for the formation of a harbor, maps, etc.

A new ship canal at South Buffalo. (see R. R. gas. May 27, 1904) 1000 words. 385 fR132

Illustrates and describes interesting engineering features. Built by the Pennsylvania and the Buffalo Susquehanna railroads.

## ALBANY BASIN.

See also Annual reports, Articles on construction and history of more than one canal, Management, Finances, Commerce and navigation, and other related headings.

An act authorizing the construction of a basin in Albany at the termination of the Erie and Champlain canals. 4p. (Ass. doc. 1823, no. 133)

Also in *Laws of New York*.

- Albany basin. (*see* Alb. daily advertiser, Apr. 14, 1823) 1600 words. N. Y. state lib.  
Report of meeting of commissioners, with form of subscription paper adopted, etc.
- (*see* Alb. daily advertiser, Apr. 16, 1823) 800 words. N. Y. state lib.  
Signed "V." Necessity and usefulness, cost of construction and probable revenue.
- Let Albany flourish. (*see* Alb. daily advertiser, May 19, 1823) 1600 words. N. Y. state lib.  
Signed "An Albanian." Advantages to follow construction of Albany basin.
- Memorial of E. C. Genet and others of Greenbush, against the Albany basin. 4p. (Ass. doc. 1823, no. 153)
- N. Y. (state)—Attorney-General. Report on the subject of the Albany basin. 6p. (Ass. doc. 1823, no. 190; or, Ass. jour. 1823, 46:705-10)
- N. Y. (state)—Canal commissioners. Communication as to a basin at Albany, at the termination of the Erie and Champlain canals. (*see* Ass. jour. 1823, 46:410)
- N. Y. (state)—Canals, Committee on. Report in favor of a bill for the construction of a basin at Albany. (*see* Ass. jour. 1823, 46:600; also Ass. doc. 1823, no. 132)  
Also in *Albany daily advertiser*, Mar. 8, 1823, 3200 words.
- An act, passed Apr. 20, 1825, to amend an act entitled "an act authorising the construction of a basin in the city of Albany at the termination of the Erie and Champlain canals," passed Apr. 5, 1823. (*see* Laws of New York)
- An act, to incorporate the Albany basin company. 5p. (Ass. doc. 1825, no. 118)
- Albany pier and basin. (*see* Alb. daily advertiser, May 7, 1825) 1400 words. N. Y. state lib.
- Descriptive.
- Genet, Edmund Charles Edouard. Note on the Albany basin. (*see* his Address. 1825. Appendix, p.39-42) 380 G28
- N. Y. (state)—Select committee. Report on petition of the subscribers to the fund for erecting a basin in the Hudson river in front of Albany. 2p. (Sen. doc. 1825, no. 117; or, Sen. jour. 1825, 48:169-70)
- Van Vechten, Abraham and others. Memorial relative to injuries to property due to the erection of the Albany pier. 16p. O. 040 P v.2119
- An act for making an opening in the north end of Albany pier, passed Apr. 9, 1828. (*see* Laws of New York)
- N. Y. (state)—Canal commissioners. Report on the petition of William James and others against the making of an opening in the north end of Albany pier. 2p. (Ass. doc. 1830, no. 83)
- Albany basin. (*see* Alb. daily advertiser, Feb. 25, 1833) 900 words. N. Y. state lib.  
Signed "Fossyeur."
- Albany basin and ship canal. (*see* Alb. daily advertiser, Feb. 28, 1833) 800 words. N. Y. state lib.
- Signed "Neptune." Concerning report of commissioners.
- Basin nuisance. (*see* Alb. daily advertiser, Mar. 29, 1833) 1100 words. N. Y. state lib.  
An examination of the trial of the indictment relative to the Albany basin.
- N. Y. (state)—Canal commissioners. Report on resolution of Senate relative to Albany basin. 5p. (Sen. doc. 1835, no. 76)
- N. Y. (state)—Judiciary, Committee on. Report on memorial of mayor, aldermen and commonalty of Albany relative to improvement of the pier and basin and remonstrance of pier owners. 4p. (Sen. doc. 1835, no. 71)
- Albany basin and Erie canal improvements suggested with a calculation on the probable expense, showing advantages and annual saving to the state. 28p. O. Alb. 1836. 040 P1 v.29
- Signed "M."
- N. Y. (state)—Select committee. Report on petitions for an opening in the Albany pier and remonstrances against same. 8p. (Sen. doc. 1836, no. 75)
- Opening in the basin. (*see* Alb. daily argus, Apr. 5, 1836) 3200 words. 071 xAll  
Historical review.
- N. Y. (state)—Select committee. Report on petition for law creating harbor-master for port of Albany. 1p. (Ass. doc. 1837, no. 292)
- Report on petition of city for amendment of law relative to navigation of Albany basin. 2p. (Ass. doc. 1837, no. 281)

Albany—Common council, Navigation committee of. Improvements of the basin. (*see* Alb. daily argus, Sept. 21, 1838) 1200 words. 071 xAll

N. Y. (state)—Canals, Committee on. Report on petition of citizens relative to widening of pier at Albany. 3p. (Sen. doc. 1838, no. 50)

N. Y. (state)—Select committee. Report on the petition of the city of Albany relative to Albany basin. 2p. (Ass. doc. 1840, no. 150)

Return of the commissioners under the acts to improve the navigation of the Albany basin, and to extend the opening in the Albany pier, made to the city of Albany, Oct. 1842. 91p. O. Alb. 1842. 040 P v.2119

Includes the assessment list for the improvement of the basin.

N. Y. (state)—Select committee. Report on petitions of citizens of Albany for relief from expenses of excavation for basin. 3p. (Ass. doc. 1843, no. 177)

N. Y. (state)—Judiciary, Committee on. Report on memorial for relief of city of Albany from expenses of excavating the basin, etc. 7p. (Ass. doc. 1844, no. 192)

N. Y. (state)—Canal board. Report on excavation of Albany basin. 3p. (Sen. doc. 1845, no. 83)

N. Y. (state)—Finance, Committee on. Report on removal of obstructions in Albany basin. 3p. (Sen. doc. 1846, no. 116)

N. Y. (state)—Claims, Committee on. Report on petitions for relief of the city of Albany from expenses incurred in excavating the Albany basin. 8p. (Ass. doc. 1847, no. 136)

——— Report on memorial for relief of city from expenses incurred in excavating the Albany basin. 15p. (Ass. doc. 1848, no. 66)

N. Y. (state)—Select committee. Report on petition of merchants and others relative to wharfage at Albany. 5p. (Ass. doc. 1848, no. 145)

Some account of acts in relation to the construction of the Albany basin, with the opinion of a member of the Albany bar as to the rights of parties interested. 35p. O. Alb. 1848.

040 P v.2119

N. Y. (state)—Canal commissioners. Report of estimates for canal basin near Albany. 5p. (Sen. doc. 1849, no. 71)

N. Y. (state)—Comptroller. Report of expenses incurred in removing obstructions from Albany basin. 4p. (Sen. doc. 1849, no. 18)

N. Y. (state)—Select committee. Report on claim of city for expenditures in excavating the Albany basin. 10p. (Sen. doc. 1849, no. 7)

N. Y. (state)—Commerce and navigation, Committee on. Minority report relative to wharfage at Albany. 3p. (Sen. doc. 1850, no. 91)

N. Y. (state)—Canal board. Report on condition of Albany basin. 12p. (Sen. doc. 1866 no. 56)

N. Y. (state)—Attorney-General. Opinion on liability of state to repair Albany basin. 4p. (Ass. doc. 1869, no. 28)

N. Y. (state)—Canal board. Statement regarding improvement of Albany basin. 4p. Sen. doc. 1869, no. 70)

N. Y. (state)—Canal department, Auditor of. Reply to a resolution as to the liability of the city of Albany for damage to property for certain improvements. 4p. (Ass. doc. 1869, no. 32)

——— Report on state's obligation to alter, repair and improve the Albany basin. 16p. (Sen. doc. 1869, no. 19)

N. Y. (state)—Engineer and Surveyor. Report on Albany basin, maps. 9p. maps. (Ass. doc. 1886, no. 95)

## NEW YORK HARBOR.

*See also* Annual reports, Articles on construction and history of more than one canal, Terminal charges, Commerce and navigation and other related headings.

N. Y. (state)—Commerce and navigation, Committee on. Report on the encroachments upon the harbor of New York. 62p. (Sen. doc. 1854, no. 49)

N. Y. (state)—Governor. Communication transmitting a memorial relative to the harbor of New York. 2p. (Sen. doc. 1854, no. 8)

N. Y. (state)—Harbor commissioners. Report relative to encroachments and preservation of the harbor of New York. 163p. (Ass. doc. 1856, no. 8)

- Report relative to encroachments in the harbor of New York 1856-57. 2v. illus. maps, O. Alb. 1857. 627 L6  
 Republished by Chamber of Commerce of New York, 1864 (627 M 4).
- N. Y. (state)—Engineer and Surveyor. New York harbor; encroachment survey. 2p. map, O. n.p. 1861. 626 M6  
 Prepared by S. H. Sweet.
- U. S.—Engineer department. Annual report of the chief of engineers for 1866-date. 627 I2  
 An analytical and topical index for 1866-1900. Scattered references.
- New York, Chamber of commerce of. Memorial in reference to the dumping of refuse in the harbor of New York. 2p. (Ass. doc. 1883, no. 90)
- Edwards, Joseph. Improvement of the channels at the entrance to the harbor of New York. (see Amer. soc. civ. eng. Transactions, 1891, 25:573-614) 620.6 N2
- Estimates for improvement of the east channel of New York harbor. (see Eng. news, 1898, p.233) 620.5 fN4

## MISCELLANEOUS BASINS.

- N. Y. (state)—Canal board. Report on memorial for construction of basin between Mohawk and Hudson railroad and canal at Schenectady. 4p. (Sen. doc. 1835, no. 31)
- N. Y. (state)—Canals, Committee on. Report on petitions of proprietors of "Child's slip" at Rochester for relief from resolution of canal commissioners closing slip. 10p. (Ass. doc. 1839, no. 120)
- N. Y. (state)—Canal commissioners. Report of estimates for canal basin near West Troy. 6p. (Sen. doc. 1849, no. 65)
- N. Y. (state)—Canals, Committee on. Report on the bill and petitions for the construction of a basin at West Troy. 4p. (Ass. doc. 1849, no. 171)
- Rome, Watertown and Ogdensburg railroad company. Petition to the canal board to provide a small canal basin at Rome. (see N. Y.—(state) Canal board. Proceedings. 1870. p.37-40) 386 N4264

## MISCELLANEOUS HARBORS.

- Van Buren harbor. (see Alb. daily argus, Nov. 25, 1836) 500 words. 071 xAll  
 From *New York times*.  
 Concerning the union of the harbor with the New York and Erie railroad.
- Van Buren harbor; Adam's Bay. (see Alb. daily argus, July 28, 1836) 1000 words. 071 xAll  
 In defense of the usefulness of the harbor.
- U. S.—Engineer department. Improvement of harbors and rivers. (see Alb. argus, Jan. 3, 1837) 5600 words. 071 xAll  
 Extracts from report.
- N. Y. (state)—Select committee. Report on powers of general government relative to improvement of rivers and harbors. 29p. (Ass. doc. 1848, no. 71)  
 Minority report, 7p. (Ass. doc. 1848, no. 72).
- N. Y. (state)—Canal board and canal commissioners. Memorial asking for the improvement of the lake harbors. 30p. O. N. Y. 1858.
- N. Y. (state)—Canal Commissioners. Memorial to congress on improvement of lake harbors. 16p. (Sen. doc. 1859, no. 2)
- U. S.—Engineer department. Annual report of the chief of engineers for 1866-date. 627 I2  
 Scattered references.  
 For the years 1866-1900 there is an analytical and topical index in three volumes.
- Hampton, F. T. Report relative to the examination and survey of the Niagara and Grass rivers and harbor at Port Day, N. Y. transmitted by the secretary of war, Jan. 24, 1881. 11p. 2 maps, O. (U. S.—House—46th Cong. 3d Sess. Ex. doc. no. 58)
- Rivers and harbors of New York district. (see Eng. news, 1883, Aug. 10:379-80) 880 words. 620.5 fN4  
 Extracts of report of Colonel Newton, engineer in charge, presented to war department, July 31.

Raymond, C. W. Breakwaters at canal entrances, Oswego and Olcott, N. Y. 1900. p.208-16, Q. (U. S.—House—56th Cong. 2d. Sess. Doc. no. 149, pt.1, Appendix no. 3)

Report to the board of engineers on deep waterways between the Great Lakes and the Atlantic tide waters. 626.9 qQo

Judson, William Pearson. Lake Ontario harbors for canal commerce. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1902, p.60-66) 626 L1

### CAYUGA MARSHES.

See also Annual reports, Articles on construction and history of more than one canal, Management, Finances and other related headings.

N. Y. (state)—Cayuga marshes, Commissioners for draining the. Report.

Ass. doc. 1827, no. 94; or, Ass. jour. 1827, 50:591

Ass. doc. 1828, no. 190; or, Ass. jour. 1828, 51:690

Ass. doc. 1829, no. 153; or, Ass. jour. 1829, 52:683-84

Ass. doc. 1830, no. 287. 2p.

Sen. doc. 1831, no. 45. 5p.

N. Y. (state)—Attorney-General. Report on petition of J. C. Baldwin and others for drainage of marshes on the outlet of Cayuga lake. (see Ass. jour. 1819, 42:510)

An act for a survey and examination of the Seneca river and the Cayuga marshes. 1p. (Sen. doc. 1823, no. 146)

An act relative to the drainage of the Cayuga marshes, passed Apr. 5, 1824. (see Laws of New York)

Also Ass. doc. 1824, no. 107.

Thomas, David. Report to the canal board in relation to the Cayuga marshes, in regard to improving navigation between the Erie canal and Seneca lake, and in relation to the marshes near Seneca lake. (see Ass. jour. 1825, 48:416-20)

N. Y. (state)—Attorney-General. Report relative to the powers of the commissioners for draining the Cayuga marshes. (see Ass. jour. 1826, 49:749)

N. Y. (state)—Select committee. Report relative to draining the Cayuga marshes. (see Ass. jour. 1828, 51:705-6)

N. Y. (state)—Select committee. Report of investigation in relation to the powers of the commissioners for draining the Cayuga marshes. (see Ass. jour. 1826, 49:1146-49)

An act to amend the act, entitled "an act for draining the Cayuga marshes and swamp lands in the valley of the Seneca river and about the Cayuga lake." 1p. (Ass. doc. 1828, no. 192)

N. Y. (state)—Select committee. Report relative to draining the Cayuga marshes and swamp lands. (Ass. doc. 1828, no. 191; or, Ass. jour. 1828, 51:705-7)

Cayuga marshes. (see Alb. daily advertiser, Feb. 19, 1830) 200 words. N. Y. state lib. Extract from Comptroller's report relative to expenditures.

N. Y. (state)—Comptroller. Report on petition for an investigation of the expenditures and accounts of the commissioners appointed to drain the Cayuga marshes. 12p. (Ass. doc. 1830, no. 178)

Report of investigation into accounts of commissioners appointed to drain Cayuga marshes. 51p. (Ass. doc. 1831, no. 70)

N. Y. (state)—Select committee. Report on Comptroller's report relative to the investigation of the accounts of the commissioners for draining the Cayuga marshes. 1p. (Ass. doc. 1831, no. 330)

Report on report of commissioners for draining the Cayuga marshes. 3p. (Sen. doc. 1831, no. 51)

N. Y. (state)—Attorney-General. Report upon concurrent resolution of Apr. 15, 1831, concerning commissioners for draining Cayuga marshes, and their treasurer. 3p. (Ass. doc. 1832, no. 6)

N. Y. (state)—Canal commissioners. Report in relation to the drainage of the Cayuga marshes. 8p. (Ass. doc. 1832, no. 51)

Report transmitting the report of James Geddes relative to draining the Cayuga marshes. 5p. (Ass. doc. 1833, no. 192)

N. Y. (state)—Commissioners. Report of the commissioners for the drainage of the Cayuga marshes. 35p. map. (Sen. doc. 1852, no. 66)

N. Y. (state)—Committee. Report relative to draining the Cayuga marshes. 34p. (Sen. doc. 1853, no. 35)

N. Y. (state)—Engineer and Surveyor. Report relative to the drainage of the Cayuga marshes. 3p. (Ass. doc. 1860, no. 101)

N. Y. (state)—Select committee. Report concerning the drainage of the Cayuga marshes. 7p. (Ass. doc. 1860, no. 97)

## LAKES.

### Cayuga lake.

N. Y. (state)—Select committee. Report on petition relative to the survey of the waters of the Seneca and Cayuga lakes, etc. 3p. (Ass. doc. 1824, no. 106; or, Ass. jour. 1824, 47:555-57)

N. Y. (state)—Canal board. Report on petition of the inhabitants of Tompkins county concerning obstructions in Cayuga inlet. 3p. (Ass. doc. 1833, no. 244)

N. Y. (state)—Canals, Committee on. Report on petition of inhabitants of Tompkins county for removal of a bar at the mouth of Cayuga lake inlet. 3p. (Ass. doc. 1833, no. 267)

N. Y. (state)—Canal board. Report on petition of Ithaca and Tompkins county, for removal of bar at mouth of inlet to Cayuga lake. 5p. (Ass. doc. 1834, no. 348)

N. Y. (state)—Canal commissioners. Report relative to removal of obstruction at mouth of inlet of Cayuga lake. 5p. (Ass. doc. 1835, no. 297)

—— Report relative to improvement of Cayuga lake inlet. 5p. (Ass. doc. 1837, no. 90)

N. Y. (state)—Select committee. Report on embankment across Cayuga lake. 3p. (Sen. doc. 1848, no. 42)

N. Y. (state)—Grievances, Committee on. Report relative to the removal of obstructions from Cayuga lake outlet. 10p. (Ass. doc. 1858, no. 46)

N. Y. (state)—Canal board. Report on effect of canal construction on discharge of water from Cayuga lake. 2p. (Sen. doc. 1864, no. 74)

Ketchum, L. S. Argument before the canal committee of the Senate of New York in favor of an appropriation for removing obstructions in the outlet to Cayuga lake, Mar. 1868. 14p. O. Clyde, 1868. 040 P v.2438

N. Y. (state)—Canal commissioners. Report concerning Cayuga lake outlet. 2p. (Ass. doc. 1871, no. 93)

N. Y. (state)—Engineer and Surveyor. Report in relation to obstructions in the outlet of Cayuga lake. 2p. (Ass. doc. 1879, no. 92)

—— Statement as to removal of obstructions, dredging, etc., of Cayuga lake outlet. 4p. (Ass. doc. 1885, no. 124)

### Seneca lake.

N. Y. (state)—Select committee. Report on petition relative to the survey of the waters of the Seneca and the Cayuga lakes, etc. 3p. (Ass. doc. 1824, no. 106; or, Ass. jour. 1824, 47:555-57)

An act, authorizing the canal commissioners to reduce the waters of Seneca lake, passed May 4. 2p. (Ass. doc. 1829, no. 162)

Also in *Laws of New York*.

N. Y. (state)—Canal commissioners. Report on the petition and remonstrance of inhabitants of county of Seneca in relation to the raising of the Waterloo dam. (see Sen. jour. 1829, 52:369-70)

—— Report on the petition concerning the reduction of Seneca lake. 2p. (Ass. doc. 1829, no. 106; or, Ass. jour. 1829, 52:515-16)

—— Report relative to injury of water-power privileges at foot of Seneca lake. 5p. (Ass. doc. 1830, no. 284)

N. Y. (state)—Select committee. Report relative to discharge of water of Seneca lake. 1p. (Ass. doc. 1830, no. 374)

N. Y. (state)—Canal commissioners. Report on condition of channel at outlet of Seneca lake, etc. 16p. (Ass. doc. 1843, no. 102)

— Report on improvements at inlet of Seneca lake. 2p. (Sen. doc. 1845, no. 55)

N. Y. (state)—Canal board. Report on construction of weir at outlet of Seneca lake. 2p. (Ass. doc. 1846, no. 166)

N. Y. (state)—Canals, Committee on. Report on construction of weir at outlet of Seneca lake. 2p. (Ass. doc. 1846, no. 177)

N. Y. (state)—Canal commissioners. Report on obstructions in outlet of Seneca lake. 16p. (Ass. doc. 1848, no. 64)

N. Y. (state)—Engineer and Surveyor. Report on flow of waters of Seneca lake. 6p. (Sen. doc. 1856, no. 81)

Remonstrance relative to bill for damming Seneca lake. 5p. (Sen. doc. 1856, no. 90)

N. Y. (state)—Engineer and Surveyor. Report on condition of harbors at head and foot of Seneca lake. 2p. (Sen. doc. 1868, no. 45)

N. Y. (state)—Attorney-General, Superintendent of Public Works, and Engineer and Surveyor. Report on a bill to regulate the flow of water of Seneca lake. 4p. (Ass. doc. 1882, no. 36)

N. Y. (state)—Engineer and Surveyor. Report on bill to regulate flow of water from Seneca lake. 1p. (Ass. doc. 1882, no. 44)

N. Y. (state)—Attorney-General, Engineer and Surveyor, and Superintendent of Public Works. Report of investigation relative to condition of state dam at Waterloo. 7p. (Ass. doc. 1887, no. 103)

N. Y. (state)—Engineer and Surveyor. Report under chap. 509 of laws of 1899 on a survey of Seneca lake and its outlet, with plans for structures providing an additional storage of water two feet above the crest of dam at Waterloo. 8p. (Sen. doc. 1900, no. 24)

#### Miscellaneous lakes.

An act to prevent obstructions in the navigation of the south end of Lake Champlain, passed Apr. 4, 1807. (see Laws of New York)

An act, passed Apr. 21, 1818, in addition to an act, entitled "an act declaring part of the outlet of Crooked lake a public highway," passed Mar. 24, 1809. (see Laws of New York)

An act declaring the outlet of Casadaga lake a public highway and for other purposes, passed Mar. 9, 1810. (see Laws of New York)

An act relative to the outlet of the Owaseo lake, passed Apr. 11, 1817. (see Laws of New York)

An act for lowering the Onondaga lake and draining the swamp and marsh lands in the town of Salina, passed Feb. 28, 1822. (see Laws of New York)

N. Y. (state)—Select committee. Report on petitions relative to the erection of a gate at the foot of Owaseo lake, and also sundry remonstrances against the same. 1p. (Ass. doc. 1830, no. 399)

N. Y. (state)—State prisons, Committee on. Report on improvement of water-power on Owaseo lake outlet. 2p. (Ass. doc. 1847, no. 231)

N. Y. (state)—Canal board. Report relative to diversion of waters of Genesee river. 35p. (Ass. doc. 1848, no. 172)

Includes report by H. S. Dexter on survey of Honeoye, Canadice, Hemlock and Conesus lakes.

N. Y. (state)—Engineer and Surveyor. Report on proposed improvement of Owaseo lake outlet. 20p. (Ass. doc. 1853, no. 37)

N. Y. (state)—Commissioners. Report on improvement of Owaseo lake. 8p. (Ass. doc. 1855, no. 35)

N. Y. (state)—Public Works, Superintendent of. Communication in regard to Owaseo outlet. 2p. (Sen. doc. 1866, no. 78)

An act to authorize the excavation, construction and maintenance of a canal and basin in Canandaigua lake, passed Mar. 31, 1868. (see Laws of New York)

Brigham, Albert P. The finger lakes of New York. (see Amer. geog. soc. of N. Y. Bulletin. 1893. 25:203-23)

A geological study.

910.6 Am31

## RIVERS.

*See also* Annual reports, Water-supply and Use of surplus waters.

## Allegheny river.

N. Y. (state)—Senate. Preamble and resolution offered by Mr. Griffin relative to appropriation by general government for improvement of the Allegheny river from Pittsburgh to Olean. 1p. (Sen. doc. 1834, no. 48)

Chamberlain, B. Communication relative to navigation of Allegheny river. 3p. (Sen. doc. 1836, no. 76)

N. Y. (state)—Engineer and Surveyor. Report relative to an examination and survey of the Allegheny river. (*see* Annual report for 1863, p.101-8) 626 L1

——— Report of examination and survey of Allegheny river. 8p. (Ass. doc. 1864, no. 12.)

## Black river.

*See* Black River canal.

## Chemung and Susquehannah rivers.

An act authorizing the survey of the Susquehannah and Chemung rivers, passed Mar. 6, 1830. (*see* Laws of New York)

N. Y. (state)—Select committee. Report in relation to the survey of the Susquehannah and Chemung rivers, and the connecting of the Otsego lake with the Erie canal, by canal or railroad. 5p. (Ass. doc. 1830, no. 63)

N. Y. (state)—Canal commissioners. Report on the survey of the Susquehannah and Chemung rivers. 54p. (Ass. doc. 1831, no. 278)

N. Y. (state)—Roads and bridges, Committee on. Report on petition to repeal an act authorizing erection of dam across Susquehannah river, in town of Chenango, county of Broome. 5p. (Sen. doc. 1831, no. 65)

N. Y. (state)—Select committee. Report on petition for authority to build dam across Susquehannah river in town of Vestal. 1p. (Ass. doc. 1831, no. 60)

——— Report on petition of I. G., and W. Hatt and A. Dana, relative to dam across Tioga river at Erwin. 1p. (Ass. doc. 1833, no. 82)

——— Report on petition of D. Mersereau for authority to maintain dam across Susquehannah river at Union. 1p. (Ass. doc. 1834, no. 97)

——— Report on petition of J. A. Seaverson and others to erect dam across Susquehannah river at Conklin. 1p. (Ass. doc. 1834, no. 159)

——— Report on petition of J. Crockett relative to dam across Susquehannah river, and remonstrance of S. Crafts. 5p. (Sen. doc. 1835, no. 17)

——— Report on petition of inhabitants of town and county of Chemung for authority to erect dam across Chemung river. 1p. (Ass. doc. 1837, no. 158)

N. Y. (state)—Engineer and Surveyor. Communication on dredging channel of Chemung river at Elmira. 2p. (Sen. doc. 1891, no. 53)

——— Resolutions offered by Mr. Fassett relative to the dredging of the channel of the Chemung river and the appropriations of moneys for said purpose. 2p. (Sen. doc. 1891, no. 34) 627.7

## East river.

U. S.—Engineer department. Annual report of the chief of engineers for 1866—date. 627 I2  
Analytical and topical index for 1866-1900. (U. S.—House—57th cong. 2d sess. doc. 439)  
Scattered references.

N. Y. (state)—Legislature. Concurrent resolution in relation to improvement of the East river. 1p. (Sen. doc. 1875, no. 44)

## Genesee river.

Maurice, T. W. Report of a survey of Genesee river, the south shore of Lake Ontario between the Genesee and Oswego rivers, and Big Sandy creek in the state of New York, transmitted Feb 2, 1829. 20p. illus. maps, O. (U. S.—House—20th Cong. 2d Sess. Ass. doc. 106)



N. Y. (state)—Select committee. Report on petition of Gardner Wells for permission to build dam across Genesee river at Solo, in Allegany county. 1p. (Ass. doc. 1832, no. 288)

— Report on petition of H. H. May and others for authority to erect dam across the Genesee river at Amity. 1p. (Ass. doc. 1832, no. 219)

— Report on petition of Ira Bacon for authority to construct dam across Genesee river. 1p. (Ass. doc. 1833, no. 31)

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— Report on petition of inhabitants of York for act to authorize Erastus Bailey to build a lock in Genesee river and to use surplus water. 1p. (Ass. doc. 1838, no. 88)

— Report on petition of W. H. Spencer for authority to erect dam across Genesee river between towns of Genesee and York, Livingston county. 2p. (Ass. doc. 1835, no. 194)

N. Y. (state)—Canal commissioners. Report on proceedings of a public meeting of citizens of Monroe county against the state dams near Rochester. 2p. (Ass. doc. 1841, no. 274)

N. Y. (state)—Canals, Committee on. Report on the petition of citizens of Monroe county relative to dam across Genesee river, etc. 2p. (Ass. doc. 1847, no. 182)

N. Y. (state)—Select committee. Report on memorial of Jacob Graves and others, occupants of the water of the Genesee river at Rochester. 6p. (Ass. doc. 1852, no. 102)

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Petition of mill owners and others requesting the construction of a dam on the Genesee river at Mount Morris. 10p. (Sen. doc. 1894, no. 46)

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#### Harlem river.

An act to incorporate the Harlem canal company, passed Apr. 18, 1826. (see Laws of New York)

Also Sen. doc. Mar. 20, 1826.

An act to amend an act, passed Apr. 18, 1826, to incorporate the Harlem canal company, passed Apr. 13, 1827. (see Laws of New York)

An act to incorporate the Harlem river canal company, passed Apr. 16, 1827. (see Laws of New York)

N. Y. (state)—Canals, Committee on. Report on petition of Peter Embury, Richard Riker and others, praying to be incorporated as the Harlem river canal company. (Ass. doc. Apr. 10, 1827, or Ass. jour. 1827, 50:1068)

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An act to amend and extend the act, passed Apr. 16, 1827, to incorporate the Harlem river canal company, passed May 13, 1836. (see Laws of New York)

An act to revive the charter of the Harlem river canal company, and extend the time for its construction, passed Apr. 18, 1838. (see Laws of New York)

N. Y. (state)—Select Committee. Report on several petitions relative to the navigation of the Harlem river. 15p. (Ass. doc. 1839, no. 190)

Morris, Lewis G. comp. anon. Harlem river; its use previous to and since the revolutionary war and suggestions relative to present contemplated improvement. 161p. O. N. Y. 1857. 387 M83

From original documents in the possession of the compiler.

An act, passed Apr. 10, 1866, to amend an act entitled "an act to incorporate the Hudson and Harlem river canal company," passed May 2, 1863 and the amendment thereto, passed Apr. 21, 1864. (see Laws of New York)

- U. S.—Engineer department. Annual report of the chief of engineers for 1866—date. 627 I2
- Analytical and topical index for 1866–1900. Scattered references.
- The Hudson and Harlem river canal project. Editorial. (see Commer. and finan. chron. 1870, 11:165–66) 1000 words. 332 qC73
- N. Y. (state)—Engineer and Surveyor. Harlem river improvement. (see Annual report for 1878, p.62–63) 626 L1
- Newton, Gen. John. Harlem river improvement; brief history. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1878, p.62–63) 626 L1
- N. Y. (state)—Harlem river improvement commission. Report of progress made. 3p. (Sen. doc. 1882, no. 71)
- Hell gate improvement and connection of the Hudson and Harlem rivers, (see Eng. news, 1884, 12:101) 75 words. 620.5 fN4
- Efforts favoring the making of above improvements.
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- Plan for the improvements, with map.
- (see R. R. gas. Dec. 28, 1894) 385 fR132
- General description of the work.
- (see Eng. news, 1895, 33:399–401) 620.5 fN4
- History and illustrated description of the improvements.
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- History of project and construction of this canal of eighteen feet depth.

## Hudson river.

See also Annual reports, Articles on construction and history of more than one canal, Ship canals, Finance and other related headings.

An act to improve the navigation of the Hudson river, passed Apr. 2, 1790. (see Laws of New York)

Northern inland lock navigation company. Report of committee to examine Hudson river, the country between that river and Wood creek, dated Oct. 30, 1792. (see Amer. state papers. Miscellaneous, 1:765–69) N. Y. state law lib.

Also in a bound volume of pamphlets (040 P v.1947).

An act to incorporate a company for the purpose of facilitating the rafting of lumber in certain parts of Hudson's river, passed Apr. 4, 1806. (see Laws of New York)

Prescott, B. Report of engineer on survey of North river between Troy and Lansingburgh Jan. 20, 1809. (see Ass. jour. 1809, 32:49–50)

An act for the improvement of the navigation of the Mohawk and Hudson rivers, passed Apr. 17, 1816. (see Laws of New York)

An act concerning Hudson's river between Troy and Waterford. 1p. (Ass. doc. 1817, Mar. 10)

Navigation of the Hudson. (see Alb. argus, June 24, 1817) 600 words. 071 xA1

Editorial on report of committee appointed to consider improvement of Hudson river between Albany and Hudson.

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Routes, estimates, structure, etc.

Genet, Edmund Charles Edouard. Memorial on the alluvions, or obstructions at the head of the navigation of the river Hudson, the impossibility of removing them effectually, the practicability of a lateral canal along those impediments. 46p. O. Alb. 1818. 380 G28

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N. Y. (state)—Hudson's river, Commissioners for improving navigation of. Communication. (see Ass. jour. 1818, 41:637–38)

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Genet, Edmund Charles Edouard. Navigation of the Hudson. (see Alb. daily advertiser, Nov. 11, 1821) 1300 words. N. Y. state lib.

Suggestions of improvements, estimates of cost, etc.

An act relative to the improvement of the navigation of Hudson's river, from Waterford to Troy. 2p. (Ass. doc. 1823, no. 157)

N. Y. (state)—Canal commissioners. Report as to a lock and dam in the Hudson above Troy. (see Ass. jour. 1823, 46:816-21)

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N. Y. state lib.

Report of celebration of their completion.

An act, for the further improvement of the navigation of the Hudson. 3p. (Sen. doc. 1824, no. 124)

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Hudson river. (see Alb. daily advertiser, Apr. 20, 1825) 1600 words.

N. Y. state lib.

Speech of Lieutenant-Governor Tallmadge in the Senate on the bill for improvement of the river.

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N. Y. state lib.

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River navigation. (see Alb. daily advertiser, Sept. 15, 16 and 17, 1825) 4600 words.

N. Y. state lib.

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N. Y. (state)—Hudson river, Joint committee on so much of the Governor's message as relates to the improvement of. Report in favor of acts to provide for said improvement and for the incorporation of the Hudson ship canal company (see Sen. jour. 1826, 49:388-91)

An act to provide for the improvement of the Hudson river, passed Apr. 16, 1827. (see *Laws of New York*)

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Improvement of river navigation. (see Alb. argus and gazette, Jan. 8, 1827) 900 words.

071 xAll

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071 xAll

Editorial on the bill relating to said improvement.

Improvement of the navigation of the Hudson river. (see Alb. argus and gazette, Mar. 17, 1827) 1200 words.

071 xAll

Improvement of the navigation; report of committee on the navigation of the Hudson river. (see Alb. argus and gazette, Feb. 5, 1827) 1400 words.

071 xAll

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071 xAll

For the removal of obstructions from the Hudson.

N. Y. (state)—Hudson river, Committee on the navigation of. Report. 3p. (Ass. doc. 1827, no. 63)

Wright, Benjamin. Improvement of our navigation by dredging. Letter. (*see* Alb. argus and gazette, Feb. 8, 1827) 600 words. 071 xAll

An act for the relief of Benjamin Akin and others, whose lands were being damaged by encroachment of Hudson river. 1p. (Ass. doc. 1828, no. 163)

An act further to provide for the improvement of the navigation of the Hudson river, passed May 5, 1829. (*see* Laws of New York)

Hudson river. (*see* Alb. daily advertiser, Nov. 19, 1829) 700 words. N. Y. state lib.  
Report of action of Albany common council requesting the federal government to improve the navigation.

N. Y. (state)—Canal commissioners. Report relative to the navigation of the Hudson river. 4p. (Ass. doc. 1829, no. 42)

N. Y. (state)—Canals, Committee on. Report on the petition of citizens of Albany for an appropriation to complete the improvement of the navigation of the Hudson. (*see* Sen. jour. 1829, 52:334-37)

N. Y. (state)—Canal commissioners. Report in relation to the improvement of the Hudson river with the steam dredging machine. 3p. (Ass. doc. 1830, no. 335)

— Report on several petitions and a remonstrance on the subject of the Fort Miller dam. 3p. (Ass. doc. 1830, no. 86)

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Genet, Edmund Charles and others. Petition of inhabitants of Rensselaer and Albany for the construction of a ship canal from Albany to the deep waters of the Hudson below New Baltimore. 24p. (Sen. doc. 1833, no. 24)

N. Y. (state)—Canals, Committee on. Report on the petition of E. C. Genet and others, relative to a ship canal from Albany to the deep waters of the Hudson. 6p. (Sen. doc. 1833, no. 80)

An act concerning the connection of the Atlantic navigation with the internal navigation of the state, by a ship canal from Albany to New Baltimore, passed May 2, 1834. (*see* Laws of New York)

The Hudson river. (*see* Alb. daily argus, July 2, 1836) 1600 words. 071 xAll  
Speech of Aaron Vanderpoel in the House of representatives on the proposed appropriation for its improvement.

Hudson river navigation. (*see* Alb. daily argus, Dec. 29, 1836) 1600 words. 071 xAll  
Report of H. Brewerton to the chief engineer on the progress of the improvement.

Navigation of the Hudson. (*see* Alb. daily argus, Dec. 29, 1837) 3000 words. 071 xAll  
Historical review.

N. Y. (state)—Select committee. Report on petition of inhabitants of Fort Edward, for authority to construct dam in Hudson river. 2p. (Ass. doc. 1837, no. 165)

Brewerton, John. Report connected with the improvement of the Hudson river navigation. 24p. O. Alb. 1839.

Hudson river improvements. (*see* Alb. daily argus, Jan. 18, 1839) 6400 words. 071 xAll  
Report of public meeting held at City Hall, Albany.

N. Y. (state)—Canals, Committee on. Report on the petition for the improvement of the Hudson river. 6p. (Ass. doc. 1839, no. 117)

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— Report relating to the continuation of the survey of the northern branches of the Hudson river, in obedience to a resolution of the Assembly, Mar. 24, 1840. 3p. (Ass. doc. 1840, no. 275)

— Report on the various petitions for, and remonstrances against, the removal of the Fort Miller dam. 3p. (Ass. doc. 1842, no. 114)

— Report on Fort Miller dam. 11p. (Ass. doc. 1849, no. 125)

N. Y. (state)—Select committee. Report on appropriation for upper waters of Hudson river 4p. (Ass. doc. 1849, no. 203)

N. Y. (state)—Canal board. Report on rights of mill owners at Fort Miller dam. 4p. (Sen. doc. 1850, no. 66)

Ship navigation to Albany. (see Amer. R. R. jour. 1852, 25:423) 620.5 QJ2  
From Albany evening journal.

An act to incorporate the Albany and New Baltimore ship canal and basin company, passed Apr. 12, 1853, (see Laws of New York)

McAlpine, William Jarvis. Reports and estimates for a ship canal and basin from Albany to New Baltimore. 64p. map. O. Alb. 1853. 626.9 L3

N. Y. (state)—Engineer and Surveyor. Report on bars in Hudson river at and near Castleton. 3p. (Sen. doc. 1853, no. 23)

U. S.—Engineer department. Report to secretary of war on improvement of Hudson river 4p. (Sen. doc. 1854, no. 31)

N. Y. (state)—Commerce and navigation, committee on. Report on improvement of Hudson river. 12p. (Sen. doc. 1855, no. 23)

N. Y. (state)—Finance, Committee on. Report on improvement of west branch of Hudson river. 4p. (Sen. doc. 1857, no. 118)

N. Y. (state)—Engineer and Surveyor. Report on river channel near West Troy. 2p. (Sen. doc. 1858, no. 82)

Navigation of the Hudson river. (see Amer. R. R. jour. 1863, 36:781-82) 1500 words. 620.5 QJ2

Historical review of efforts to improve the navigation near Troy and Albany.

N. Y. (state)—Commerce and navigation, Committee on. Report on improvement of Hudson river. 3p. (Ass. doc. 1863, no. 77)

N. Y. (state)—Commissioners. Reports for the improvement of the Hudson river between Troy and New Baltimore. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1863, p.109-12) 626 L1

N. Y. (state)—Engineer and Surveyor. Report on obstructions in Hudson river. 37p. 2 maps. (Sen. doc. 1863, no. 86)

Obstructions in the Hudson river. (see Amer. R. R. jour. 1863, 36:311) 600 words. 620.5 QJ2

Outline of expenditures from 1797.

N. Y. (state)—Commissioners. Report on progress of improvement of river between Troy and New Baltimore. 5p. (Ass. doc. 1864, no. 22; or, Sen. doc. 1864, no. 18)

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Also in (626 M6).

N. Y. (state)—Commissioners. Report under act, chap. 105, laws of 1864, for the improvement of the Hudson river. 3p. (Ass. doc. 1865, no. 26) 387

Improvement of the Hudson river. (see Amer. R. R. jour. 1866, 39:123) 360 words. 620.5 QJ2

N. Y. (state)—Commissioners. Report for the improvement of the Hudson river, 1866. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1866, p.123-29) 626 L1

— Report under act, chapter 561, laws of 1865, for the improvement of the Hudson river. 3p. (Sen. doc. 1866, no. 12) 387 N42

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Scattered references.

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N. Y. (state)—Canal Department, Auditor of. Report relative to a survey of the Hudson river to Fort Edward and of the Champlain canal enlargement from tide-water to Whitehall. 111p. (Sen. doc. 1867, no. 37)

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N. Y. (state)—Engineer and Surveyor. Report on survey of Hudson river to Fort Edward. 111p. (Sen. doc. 1867, no. 37)

Conklin, Roscoe. Jurisdiction of the states over their navigable waters; argument in the Troy and West Troy bridge case, in the circuit court of the U. S. Aug. 6, 1873, in opposition to a motion for an injunction to restrain the erection of a bridge over the Hudson river. 40p. O. Utica, 1873. 387

N. Y. (state)—Hudson river, Commissioners for the improvement of the. Report. 6p. (Sen. doc. 1874, no. 74)

Benedict, Farrand N. Report on a survey of the waters of the Upper Hudson and Raquette rivers in the summer of 1874, with reference to increasing the supply of water for the Champlain canal and improving the navigation of the Hudson river. p.83-160. (Ass. doc. 1875, no. 6)

Also in *Annual report of canal commissioner for 1874* (626 L 1).  
Includes reports of W. B. Cooper, F. F. Judd and J. F. Potter.

N. Y. (state)—Comptroller. Statement of amounts expended by state for past thirty years on improvement of Hudson river. 2p. (Ass. doc. 1878, no. 79)

N. Y. (state)—Engineer and Surveyor. Report relative to fishways in Hudson river dams. 8p. with cuts. (Sen. doc. 1884, no. 58)

N. Y. (state)—Governor. An act for the improvement of the navigation of the Hudson river and Catskill creek and to make an appropriation therefor; veto message. (see Tilden, S; J. Writings and speeches 1885, 2:208-9) 308 T45

N.Y. (state)—Finance, Committee on. Report on obstructions in Hudson river. 23p. (Sen. doc. 1889, no. 38)

N. Y. (state)—Engineer and Surveyor, and Superintendent of Public Works. Communication relative to condition of state dam in Hudson river at Troy. 3p. (Ass. doc. 1890, no. 69)

Hudson river improvement and deepening and its relation to the commerce of the nation; proceedings of a public hearing held in Albany, Jan. 6, 1891, called by the board of officers of the corps of engineers, U. S. A. 50p. O. Troy and Albany, 1891. 387

Published by the Albany Chamber of commerce and the Troy Citizens' association.

Contents: Addresses by J. H. Manning, V. H. Youngman, E. P. Durant, M. I. Townsend, F. H. Holbrook, C. L. McArthur, S. A. Thompson, G. S. Coleman, T. A. Johnson, J. F. Lape, H. G. Burleigh, H. B. Silliman, W. E. Cleary, W. F. Tefft, Col. Furman, W. H. Crombie, H. C. Brewster, J. Y. McClintock, John Lighton and D. C. Herrick.

N. Y. (state)—Engineer and Surveyor. Report on the state dams across the Hudson river at Troy and the Mohawk river at Cohoes. 11p. (Ass. doc. 1893, no. 52)

Maloney, J. E. Basin of the Great Lakes and of the St. Lawrence and Hudson rivers, with map, no. B. (see U. S.—Deep waterways commission. Report. 1897. p.145-54) 386 Un3

Rafter, George W. The economics of the Hudson river. 20p. O. n.p. 1897 627.1  
Lecture before the engineering classes of Rensselaer Polytechnic Institute, Feb. 24, 1897.

Upper Hudson storage surveys. 193p. illus. maps. O. Alb. 1896. 626.2  
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### Mohawk river.

See also Annual reports, Articles on construction and history of more than one canal and other related headings.

An act for the improvement of the navigation of the Mohawk and Hudson rivers, passed Apr. 17, 1816. (see Laws of New York)

An act to authorize the erection of a dam across the Mohawk river, at Utica. 1p. (Sen. doc. 1823, no. 112)

N. Y. (state)—Canal commissioners. Report on the petition of John Burr to erect a dam across the Mohawk at Whitestown. (see Ass. jour. 1824, 47:746)

N. Y. (state)—Canal appraisers. Communication relative to individual ownership to the middle of waterways in connection with claim of George Tibbits on Mohawk river. (see Ass. jour. 1827, 50:805-8)

N. Y. (state)—Canals, Committee on. Report on petitions and memorials of citizens of counties between Schenectady and Erie, praying for improvement of Mohawk river, or for a canal on north side thereof. (Ass. doc. 1828, no. 150 or, Ass. jour. 1828, 51:695.)

Internal improvement. (see Alb. argus, Jan. 14, 1836) 700 words.

071 xAll

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The Mohawk and its improvement. (see Hulbert, A. B. The great American canals, 1904. v.2, p.15-42) 917.3 H871

#### Neversink river.

An act to loan the credit of the state to the Neversink navigation company passed Apr. 15, 1828. (see Laws of New York)

N. Y. (state)—Canals, Committee on. Report on petition of Neversink navigation company. (see Ass. jour. 1828, 51:760-61)

Report on petition of O. W. Van Tuyl, president of the Neversink navigation company, praying for a further loan from the state, to complete the improvement of the navigation of Neversink river. 6p. (Sen. doc. 1830, no. 358)

N. Y. (state)—Comptroller. Report relative to the loan to the Neversink navigation company. (Ass. doc. 1830, no. 49)

N. Y. (state)—Finance, Committee on. Report on Assembly bill to release S. Barnum and H. Howell from a judgment against them as sureties on the bond of the Neversink navigation company. 2p. (Sen. doc. 1832, no. 111)

Clinton, Col. De Witt. Report to the Topographical bureau of the department of war on the survey and examination of the Neversink river from the falls at T. S. Lockwoods to its junction with the Delaware river, at Carpenter's point, accompanied by other documents. 24p. O. N. Y. 1833. 040 P v.145

N. Y. (state)—Attorney-General. Report on petition of Otto W. Van Tuyl, president of the Neversink navigation company praying for the release of the state's claim. 15p. (Ass. doc. 1833, no. 262)

Report on bill to provide for the liquidation of the stock loaned to the Neversink navigation company. (Sen. doc. 1836, no. 60)

#### Niagara river.

N. Y. (state)—Canal commissioner. Report upon the petition of Nathaniel Sill and others, relative to towing vessels up the rapids of the Niagara river, at Black Rock. (Ass. jour. 1821, 44:759)

U. S.—Engineer department. Annual report of the chief of engineers for 1866—date.

627 12

Analytical and topical index for 1866-1900. Scattered references.

U. S.—Engineer department. Report relative to the examination and survey of the Niagara and Grass rivers and harbor at Port Day, N. Y., 1880. 11p. O. (U. S.—House—46th cong. 3d sess. ex. doc. 58)

Stewart, C. B. Niagara river discharge; report to the board of engineers on deep waterways between the Great Lakes and the Atlantic tide waters, 1899. p.298-321, Q. (U. S.—House—56th cong. 2d sess. Doc. no. 149, pt.1. appendix no. 7) 626.9 qQ0  
Atlas. pt. 3.

Proposed improvement of the Niagara river. (see The Engineer, Aug. 26, 1904, p.201) 400 words.

620.5 fL6

Plan suggested to Manufacturers' club of Buffalo by G. R. Sikes.

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See Oneida Lake canal and river improvement.

#### Oswego river.

See Oswego canal and river.

#### Seneca river.

Mynderse, W. Copy of a letter to one of the commissioners relative to improvements in the Seneca river. (see N. Y. (state)—Canal Commissioners. Report 1817) 626 H7 v.1

Also in *Public documents* compiled by C. G. Haines in 1821, p.221-23 (386 H 12); and *Laws in relation to the Erie and Champlain canals* to 1825, 1: 317-20 (386 qN42).

N. Y. (state)—Canal commissioners. Report on petition of Ontario, Seneca and Cayuga counties relative to the improvement of the Seneca river. (*see* Sen. jour. 1823, 46:74)

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N. Y. (state)—Canals, Committee on. Report on petitions for act to improve Oneida and Seneca rivers. 5p. (Ass. doc. 1836, no. 264)

N. Y. (state)—Select committee. Report on petition of Porter Wethy for authority to erect dam across Seneca river at Conquest. 1p. (Ass. doc. 1836, no. 32)

N. Y. (state)—Canal commissioners. Report on petition of Otis Bigelow, S. C. Parker and others for amendment to act to improve Seneca river. 1p. (Ass. doc. 1837, no. 114)

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N. Y. (state)—Engineer and Surveyor. Statement on dredging, etc., of Seneca river. 4p. (Ass. doc. 1885, no. 124)

#### Tonawanda creek.

N. Y. (state)—Canal commissioners. Report on petition for privilege of connecting with the dam across Tonawanda creek a lock for passing boats. (*see* Ass. jour. 1826, 50:719)

——— Report on petition of inhabitants of Erie and Niagara counties for a reduction of the dam in Tonawanda creek. (*see* Ass. jour. 1829, 52:635)

Petition could be granted only at great expense and abandoning much of the navigation of the creek.

N. Y. (state)—Canals, Committee on. Report on petition of citizens of Erie and Niagara counties for lowering a dam in Tonawanda creek. (Ass. jour. 1829, 52:650-51)

N. Y. (state)—Select committee. Report on the petition praying that Clark Hilton may erect a dam and lock upon Tonawanda creek. 1p. (*see* Ass. doc. 1830, no. 293)

N. Y. (state)—Canal commissioners. Report in relation to lands overflowed by water on Tonawanda and Ellicott creeks. 15p. (Ass. doc. 1838, no. 124)

N. Y. (state)—Canal board. Report on draining lands between Tonawanda and Ellicott creeks. 7p. (Ass. doc. 1847, no. 198)

N. Y. (state)—Engineer and Surveyor. Report on expense of lowering Tonawanda dam two feet, with testimony. 19p. (Ass. doc. 1860, no. 77)

N. Y. (state)—Canal board. Report on precautionary measures to prevent Tonawanda creek from overflowing its banks. 11p. map. (Sen. doc. 1870, no. 36)

N. Y. (state)—Claims, Committee on. Report on petitions of P. W. Anthony and others for relief from damages sustained in consequence of the state dam in Tonawanda creek. 1p. (Ass. doc. 1870, no. 45)

N. Y. (state)—Canal board. Proceedings relative to removal of state dam in Tonawanda creek. 2p. (Sen. doc. 1871, no. 46)

N. Y. (state)—Canal commissioner. Report on feasibility of draining lands overflowed by water in towns of Pendleton and Wheatfield. 2p. (Ass. doc. 1871, no. 119)

#### Miscellaneous rivers.

An act to amend an act passed Apr. 1, 1808, for opening and establishing a lock navigation on the river St. Lawrence, in the town of Madrid, passed Mar. 1, 1811. (*see* Laws of New York)

An act to incorporate the Catetunck lock navigation company, passed Mar. 3, 1815. (*see* Laws of New York)

An act to extend time for completion of lock navigation on the river St. Lawrence to 1816, passed Mar. 17, 1815. (*see* Laws of New York)

N. Y. (state)—Canal commissioners. Report on petitions for clearing Chitteningo creek. (*see* Ass. jour. 1824, 47:493)

——— Report against the advisability of continuing Clydé river as a public highway. 70 words. (*see* Ass. jour. 1825, 48:538)

——— Report on petition of inhabitants of Springwater, Livingston Co. praying removal of dam in Hemlock lake. (*see* Ass. jour. 1829, 52:872)

Dam could be removed without injury to public uses.



N. Y. (state)—Select committee. Report on petition of inhabitants of Allegany and Cattaraugus counties, that part of Dodge's creek may be declared a public highway. 1p. (Ass. doc. 1831, no. 326)

——— Report on petition of Charles Sprague to maintain dam on Chenango river. 1p. (Ass. doc. 1831, no. 232)

——— Report on petition of inhabitants of Ulster and Greene counties for an act of incorporation for the purpose of improving the channel of Esopus creek. 1p. (Ass. doc. 1832, no. 16)

——— Report on petition of Jared Ketcham and others for a law authorizing them to erect a dam across Canistota river in Steuben county. 1p. (Ass. doc. 1832, no. 87)

——— Report on petition for an act authorizing Gilman and Myers to build dam across the Canistota river at Cameron. 1p. (Ass. doc. 1833, no. 50)

——— Report on petition of Alexis Ward for authority to erect dam across Orchard creek at Carlton. 1p. (Ass. doc. 1833, no. 253)

——— Report on petition of J. and P. Murphy to repair dam in Schoharie creek in town of Fulton. 1p. (Ass. doc. 1834, no. 321)

——— Report on petition of J. Cooper, jr., for permission to build dam across Cohocton river at Erwin. 1p. (Ass. doc. 1834, no. 286)

——— Report on petition of J. Russell and J. E. Norman for authority to construct dam across Schoon river, between towns of Bolton and Chester, Warren county. 1p. (Ass. doc. 1834, no. 373)

——— Report on bill authorizing William Woods to erect dam across Canistota river. 1p. (Ass. doc. 1835, no. 38)

——— Report on petition of inhabitants of Oswego county, relative to Big Salmon river. 2p. (Ass. doc. 1836, no. 183)

N. Y. (state)—Internal affairs of towns and counties, Committee on. Report on petitions of inhabitants of Schoharie and Greene counties, to prevent obstruction of Schoharie creek and tributaries. 2p. (Ass. doc. 1838, no. 191)

N. Y. (state)—Select committee. Report on petition of A. Erwin for authority to build dam across Canistota river at Erwin. 1p. (Ass. doc. 1838, no. 327)

N. Y. (state)—Canal commissioners. Report on petition for draining lands on Scajaquadd creek at Black Rock. 3p. (Ass. doc. 1845, no. 27)

N. Y. (state)—Grievances, Committee on. Report of majority and minority on petitions that certain rivers in St. Lawrence county be declared public highways. 10p. (Ass. doc. 1847, no. 223)

N. Y. (state)—Select committee. Report on draining of lands near Scajaquadd creek, town of Black Rock. 5p. (Ass. doc. 1847, no. 27)

——— Report on powers of general government relative to improvement of rivers and harbors. 29p. (Ass. doc. 1848, no. 71)

Minority report, 7p. (Ass. doc. 1848, no. 72).

——— Report on improvement of Raquette river. 32p. (Ass. doc. 1850, no. 68)

——— Report on appropriation for improvement of Saranac river and lakes. 4p. (Ass. doc. 1851, no. 94)

N. Y. (state)—Commerce and navigation, Committee on. Report on a bill for an appropriation to improve Oswegatchie river. 2p. (Ass. doc. 1852, no. 93)

N. Y. (state)—Ways and means, Committee on. Adverse report on petition for improvement of Big Chazy river. 2p. (Ass. doc. 1852, no. 57)

N. Y. (state)—Select committee. Report on improvement of Raquette river. 4p. (Sen. doc. 1854, no. 24)

——— Report on improvement of St. Regis river. 2p. (Ass. doc. 1856, no. 112)

N. Y. (state)—Attorney-General. Opinion on constitutionality of laws making streams public highways. 6p. (Ass. doc. 1858, no. 112)

N. Y. (state)—Commerce and navigation, Committee on. Report relative to improvement of Beaver river. 4p. (Ass. doc. 1860, no. 91)

N. Y. (state)—Engineer and Surveyor. Report on improvement of Walkill river. 3p. (Sen. doc. 1880, no. 42)

U. S.—Engineer department. Report of survey of Bronx river, 1880. 5p. (U. S.—House—46th cong. 3d sess. Ex. doc. 54)

Report of Mayor of New York on proposed legislation for deepening channel of Spuyten Duyvil creek. 4p. (Ass. doc. 1883, no. 82)

### MANAGEMENT.

*See also* Annual reports, Articles on construction and history of more than one canal, names of canals, basins, harbors and rivers, also Contracts, Claims, Finances, Terminal charges, Canal tolls, Canal tolls on railroads, Investigations, Commerce and navigation, Water-supply, Use of surplus waters, Canal lands, Canal-boats, Canal scales, Canal-locks, Means of propulsion on canals, etc.

N. Y. (state)—Governors. Messages.

Ass. jour. 1853, 76:23-24    Ass. jour. 1878, 101:16-17, 1219-22

" 1854, 77:30-33    " 1879, 102:15-16

" 1870, 93:14-15    " 1880, 103:15

" 1875, 98:24, 29    " 1900 123:14-17, 229-34

Sen. doc. 1875, no. 64

Ass. jour. 1876, 99:20-27

Canal management.

N. Y. (state)—Canal commissioners. Copies of official forms for articles of agreement connected with construction of canals, 1817 (?) (*see* Haines, C: G. *comp.* Public documents, 1821, p.294-307) 386 H12

N. Y. (state)—Comptroller. Certificate relative to expenditures of canal commissioners. (*see* Ass. jour. 1817, p.729)

An act for the maintenance and protection of the Erie and Champlain canals and the works connected therewith, passed Apr. 13, 1820. (*see* Laws of New York)

Also Ass. doc. 1820, no. 155.

Reprint in *Public documents* compiled by C: G. Haines, 1820, p.471-79 (386 H 12).

N. Y. (state)—Comptroller. Report on subject of auditing canal commissioners' accounts. (*see* Sen. jour. 1820, 44:46)

An act, to regulate and encourage the internal navigation and carrying trade of this state. 2p. (Ass. doc. 1821, no. 96)

An act defining the duties of canal commissioners in certain cases, and for other purposes. 2p. (Ass. doc. 1823, no. 226)

An act for the appointment of canal commissioners, and to prescribe their term of office. 1p. (Ass. doc. 1823, no. 164)

An act to authorize the appointment of appraisers on the Erie and Champlain canals. 2p. (Ass. doc. 1823, no. 210)

Reminiscences, No. 6. (*see* Alb. daily advertiser, Oct. 16, 1823) 1200 words.

N. Y. state lib.

Signed "Investigator."

Concerning unjustifiable criticism of management of canal affairs by the commissioners.

N. Y. (state)—Canal commissioners. Report of number and names of collectors of toll on canals for 1823, amount of toll collected by each, their annual salary, amount of bail, etc. (*see* Ass. jour. 1823, 46:804-5)

Also in *Albany daily advertiser*, Apr. 4, 1823, 800 words.

An act for the recovery of demands, arising on contract with the canal commissioners. 1p. (Ass. doc. 1824, no. 97)

An act to authorize the appointment of appraisers on the Erie and Champlain canals. 2p. (Ass. doc. 1824, no. 75)

An act to provide for the appointment of canal commissioners, principal engineers and collectors of toll on the canals. 1p. (Ass. doc. 1824, no. 127)

An act concerning the Erie and Champlain canals. 2p. (Sen. doc. 1825, no. 256)

Canal. (*see* Alb. daily advertiser, Mar. 22, 1825) 700 words.

N. Y. state lib.

Signed "A citizen." Suggestions on management.

N. Y. (state)—Canal fund, Commissioners of the. Digested system for the regulation and management of the Erie and Champlain canals, in reference to the Engineer department, to the appointment of superintendents and collectors, to the disposal of surplus water for hydraulic purposes, to the collection of tolls, and to every other matter appertaining to the canal fund. (*see* Ass. jour. 1825, 48:43-52)

Documents accompanying report of canal fund commissioners to the Legislature, Jan. 30 1825, 23p.F. (*see* Ass. jour. 1825, v.48, Appendix A).

N. Y. (state)—Canals, Joint committee on. Report, followed by an act for the establishment of a board of internal improvements and for other purposes. 32p. O. Alb. 1825.

040 P. v145.

Also *Sen. jour.* 1825, 48:222-30.

An act concerning the Erie and Champlain canals. 2p. (Ass. doc. 1826, No. 214)

An act relative to canals, passed Apr. 18, 1826. (*see* Laws of New York)

Also *Sen. doc.* 1826, no. 210.

Officials and their duties.

An act to amend an act, entitled "an act for the maintenance and protection of the Erie and Champlain canals, and the works connected therewith." 3p. (Ass. doc. 1826, no. 249)

N. Y. (state)—Canal commissioners. Report relative to names and compensation of persons employed the last year, excepting those having contracts. (*see* *Sen. jour.* 1826, 49:358)

N. Y. (state)—Comptroller. Report of names of persons employed by the canal commissioners during the past year. (Sen. doc. 1826, no. 167; or, *Sen. jour.* 1826, 49:319-36)

N. Y. (state)—Senate. Resolutions proposing that the collectors of canal tolls should be appointed by the Governor and the Senate. 2p. (Sen. doc. 1826, no. 183)

An act, passed Apr. 12, 1827, to amend an act entitled "an act for the maintenance and protection of the Erie and Champlain canals and the works connected therewith," passed Apr. 13, 1820.

Incomplete form in *Sen. doc.* 1827, no. 159.

An act passed, Apr. 17, 1827, to amend the act entitled "an act relative to canals," passed Apr. 18, 1826. (*see* Laws of New York)

Bill entitled "an act to prevent trespasses on the canals, and for other purposes. 2p. (Ass. doc. 1827, no. 60)

N. Y. (state)—Canal commissioners. Report relative to the lock-tenders on the canals. 1p. (Ass. doc. 1828, no. 248; also *Ass. jour.* 1828, 51:1022)

N. Y. (state)—Canals, Committee on. Report on the petition of Samuel Hecox and associates praying that certain equitable powers be granted the canal commissioners. 4p. (Sen. doc. 1828, no. 245)

An act concerning the appraisement of damages on canals, and the compensation allowed to the canal appraisers. 1p. (Sen. doc. 1829, no. 58)

An act in relation to the appraisal of damages on the canals, and for other purposes, passed May 4, 1829. (*see* Laws of New York)

Also *Ass. doc.* 1829, no. 180.

An act providing for the payment of damages to real estate, in consequence of breaches in the canals of the state, and for other purposes, passed Mar. 5, 1829. (*see* Laws of New York)

An act to authorize the appraisal of certain damages on the Champlain canal, passed Apr. 8, 1829. (*see* Laws of New York)

N. Y. (state)—Canal board. Report on memorial of inhabitants of town in Herkimer county relative to defects in the height and width of the banks of the canal, necessary repairs, etc. 4p. (Ass. doc. 1833, no. 272)

N. Y. (state)—Canal Commissioners. Report of committee on canals and internal improvements, on communication of the canal commissioners relative to an additional acting canal commissioner. 3p. (Ass. doc. 1833, no. 240)

N. Y. (state)—Canal fund, Commissioners of. Report concerning the authority under which allowances have been made to G. W. Newell, as Comptroller's clerk, and the sums paid him since 1829. 11p. (Ass. doc. 1833, no. 271)

N. Y. (state)—Attorney-General. Report on bill for release of Enos Stone and others from payment of a bond for a collector for canal tolls. 4p. (Ass. doc. 1834, no. 381)

N. Y. (state)—Canal board. Rates of toll, canal regulations and distances on the state canals, Mar. 22, 1834. 40p. O. 386

N. Y. (state)—Canal fund, Commissioners of. Report on petition of W. Buell for indemnity for costs of lawsuits while canal superintendent. 2p. (Ass. doc. 1834, no. 318)

N. Y. (state)—Comptroller. Report on petition of Jabes Burrows, canal collector of West Troy, to be relieved from the payment of certain money due from errors in balancing accounts. 3p. (Sen. doc. 1835, no. 63)

N. Y. (state)—Canals, Committee on. Report on Senate bill increasing salary of acting canal commissioner. 4p. (Ass. doc. 1836, no. 86)

- Forms and instructions etc. in relation to the accounts of collectors of tolls on the New York state canals. 44p. F. Alb. 1837. 386
- N. Y. (state)—Select committee. Report on petition for law creating harbor-masters for port of Albany. 1p. (Ass. doc. 1837, no. 292)
- N. Y. (state)—Canal board. Report giving names and compensation of officers, appointed by canal board or commissioners, and employed on state canals. 12p. (Ass. doc. 1838, no. 231)
- N. Y. (state)—Governor. Message. (*see* Ass. jour. 1839, 62:13)
- Recommends that the present canal commissioners and canal board be replaced by a board of internal improvements.
- Some remarks upon the present state of internal improvements. (*see* Amer. R. R. jour. 1839, 9:357-61) 1000 words. 620.5 J2
- Difficulties in their management by the state.
- N. Y. (state)—Canal fund, Commissioners of. Regulations respecting the issue and transfer of certificates of stock. 16p. O. Alb. 1840. 040 P. v.1947
- N. Y. (state)—Legislature. Canal laws, rates of toll and regulations on the canals in force June 1841. 111p. O. Alb. 1841. N. Y. state law lib.
- N. Y. (state)—Canal commissioners. Report relative to engineers in the employ of the state. 40p. (Ass. doc. 1842, no. 45)
- N. Y. (state)—Canals, Committee on. Report on petition praying that the canals may be opened at the earliest moment practicable. 3p. (Ass. doc. 1842, no. 110)
- New York state works. (*see* Amer. R. R. jour. 1842, 15:353-59) 1700 words. 620.5 J2
- Disadvantages of the canal system.
- N. Y. (state)—Canal board. Canal regulations, rates of toll and names of the principal places with their distances from each other on the New York state canals, as established May, 1843. 60p. O. Alb. 1843. 040 P. v. 258, or v. 145
- N. Y. (state)—Canals, Committee on. Minority reports on policy of suspending work. 28p. Ass. doc. 1843, no. 168  
11p. Ass. doc. 1843, no. 170
- N. Y. (state)—Canal board. Report on petition for compensation for Rousseau Sweet for care of lock and dam, no. 2 on the Oneida river improvement. 3p. (Ass. doc. 1844, no. 114)
- N. Y. (state)—Senate. Resolutions favoring necessary repairs on Erie canal. 1p. (Sen. doc. 1844, no. 108)
- N. Y. (state)—Canal Commissioners. Report as to authority of the commissioners to preserve and protect the materials on the unfinished canals. 3p. (Sen. doc. 1845, no. 72)
- Report on engineers in service of state. 16p. (Sen. doc. 1845, no. 23)
- Report on protection of unfinished works on lateral canals. 3p. (Ass. doc. 1845, no. 150)
- N. Y. (state)—Canals, Committee on. Report on appeals from canal board to the supreme court, *a certiorari*. 5p. (Ass. doc. 1845, no. 195)
- Includes report on petitions of canal contractors.
- N. Y. (state)—Finance, Committee on. Report against bill for removal of cases of appeal from canal board to supreme court. 3p. (Sen. doc. 1845, no. 103)
- N. Y. (state)—Canal commissioners. Report on materials encumbering private property at Lockport. 3p. (Ass. doc. 1846, no. 35)
- Report on method of conducting repairs on canals. 6p. (Sen. doc. 1846, no. 27)
- N. Y. (state)—Canals, Committee on. Report on bill relative to constitution of canal board. 2p. (Sen. doc. 1846, no. 128)
- Report on building materials encumbering streets and private property at Lockport. 1p. (Ass. doc. 1846, no. 185)
- N. Y. (state)—Legislature. Canal laws, regulations, rates of toll on the canals in force May, 1846. 129p. O. Alb. 1846. N. Y. state law lib.
- N. Y. (state)—Canal board. Regulations in relation to engineers and superintendents of canal repairs. 16p. O. n.p. 1847? 040 P. v.258
- Report on engineers, agents, draftsmen, and surveyors employed by canal commissioners. 11p. (Ass. doc. 1847, no. 137)
- N. Y. (state)—Canal commissioners. Report of quantity and value of materials on hand at stoppage of work on canal enlargement in 1842. 20p. (Sen. doc. 1847, no. 59)

N. Y. (state)—Canals, Committee on. Minority report on so much of the Governor's message as relates to the superintendence and repairs of the canals and the engrossed bill from Assembly, entitled an act relative to canal repairs and to reduce the expenses thereof. 14p. (Sen. doc. 1847, no. 79)

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N. Y. (state)—Canal board. Laws, regulations, rates of toll and names of the principal places, with their distances from each other, of the New York state canals; as established by the canal board, May, 1850. 187p. O. Alb. 1850. 386 N4268

Also in volume of pamphlets (040 P v.258).

— Proceedings, Aug. 25-26, 1852. 7p. O. 040 P v.1947

N. Y. (state)—Judiciary, Committee of. Report relative to powers of canal board, the submission of certain questions to court of appeals. 3p. (Sen. doc. 1852, no. 15)

N. Y. (state)—Canal Commissioners. Report on business, tolls, and estimates for repairs of Champlain canal. 7p. (Sen. doc. 1853, no. 80)

— Report relative to suspensions of navigation on Erie and Champlain canals. 6p. (Ass. doc. 1853, no. 129)

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N. Y. (state)—Attorney-General. Opinion on constitutionality of bill for construction of toll bridge across Chenango river at Binghamton. 18p. (Sen. doc. 1854, no. 87)

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— Rules and orders. 8p. O. Alb. 1854. 040 P v.1947

N. Y. (state)—Canal department, Auditor of. Circulars to collectors of canal tolls, weighmasters, inspectors of boats and cargoes and lock-tenders on the New York state canals. 45p. O. Alb. 1854. 040 P v.2437

N. Y. (state)—Select committee. Report on election of Auditor of Canal Department. 6p. (Sen. doc. 1854, no. 36)

Minority report, 7 p. (Ass. doc. 1855, no. 108).

New York canals—Wisdom yet. (see Amer. R. R. Jour. 1855, 28:200) 700 words.

Resolution that the banks receiving deposits of canal tolls should use the same in discount of such paper as will tend to promote the interest of the canals. 620.5 qJ2

N. Y. (state)—Canal board. Majority report on abolition of office of canal superintendent. 6p. (Sen. doc. 1856, no. 42)

Minority report, 11p. (Sen. doc. 1856, no. 43).

N. Y. (state)—Canal commissioner. Report on repairs of embankment at Cohoes. 4p. (Ass. doc. 1856, no. 87)

N. Y. (state)—Canals, Committee on. Report on bill relative to repairs and superintendence 5p. (Sen. doc. 1856, no. 31) 040 P v.1233

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— Report of names of clerks employed, etc. 3p. (Ass. doc. 1859, no. 147)

— Report on salaries of officers, clerks, and employees. 3p. (Ass. doc. 1859, no. 95)

N. Y. (state)—Canal board. Petition relative to engineer corps. 2p. (Sen. doc. 1861, no. 41)

N. Y. (state)—Claims, Committee on. Report on extension of jurisdiction of canal appraisers. 2p. (Ass. doc. 1861, no. 62)

N. Y. (state)—Canal board. Memorial and resolution relative to claim for relief of Warren Granger, collector of canal tolls. 2p. (Sen. doc. 1863, no. 12)

— Recommendation to pass certain canal bills. 1p. (Sen. doc. 1863, no. 59)

N. Y. (state)—Canals, Committee on. Minority report on abolishing office of canal appraiser. 4p. (Ass. doc. 1863, no. 133)

N. Y. (state)—Legislature. Laws, regulations, rates of toll . . . in force May, 1863. 234p. O. Alb. 1863. N. Y. state law lib.

N. Y. (state)—Canal Department, Auditor of. Statement of estimates and payments for repairs of breaks in Genesee Valley canal. 22p. (Ass. doc. 1867, no. 136)

N. Y. (state)—Judiciary, Committee on. Report as to the liability of the state in the management of its canals. 3p. (Ass. doc. 1867, no. 71)

Memorial of the New York state canal convention, concerning the improvement of inland navigation, with expressions of opinions in that convention, together with accounts of preliminary proceedings of various boards of trade and popular meetings in Buffalo, Rochester, New York and other cities through which the state canal convention originated, for the purpose of securing reform and improvement in the canal management. 44p. O. N. Y. 1868.

Contains some extracts from prominent journals showing public appreciation, also a brief account of the grand banquet given by citizens of Albany. 040 P v.2124

Memorial of transportation companies for repairs on Champlain canal. 1p. (Sen. doc. 1868, no. 54)

N. Y. (state)—Canal board. Proceedings relative to compensation of Alexander Barkley for services as agent on the canals. 14p. (Ass. doc. 1868, no. 73)

— Report on needed canal repairs. 5p. (Sen. doc. 1868, no. 75)

N. Y. (state)—Attorney-General. Opinion on liability of state to repair Albany basin. 4p. (Ass. doc. 1869, no. 28)

N. Y. (state)—Governor. Message. (see Ass. Jour. 1869, 92:19)  
Recommends repeal of contract system for repairs of canals.

Commercial union of the state of New York. Proceedings of the state convention held at Rochester, Jan. 19, 1870, to consider measures for reforming the management and improving the trade of the New York state canals. 111p. O. N. Y. 1870. 040 P v.2124

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N. Y. (state)—Canal board. Report of committee relative to what powers were conferred upon the canal board by chapter 55 of the laws of 1870. (see Proceedings, 1870, p.187-90)

386 N4264

— Resolution relative to management of canals. 2p. (Sen. doc. 1872, no. 36)

N. Y. (state)—Canal Department, Auditor of the. Circular to superintendents of canal repairs, explanatory of duties. 12p. (see N. Y. (state)—Canal commissioners. Annual report for 1870-72) 626 H7

See indexes to volumes for page references.

N. Y. (state)—Canals, Committee on. Minority report on bill to repeal law giving jurisdiction of claims to canal appraisers. 7p. (Ass. doc. 1872, no. 107)

Barkley, Alexander. Reply to Mr. Raines, Treasurer, made to the Assembly canal committee, Mar. 27, 1873. (see N. Y. (state)—Canal board. Proceedings, 1873, p.83-90) 386 N4264

Fay, John D. Reply to a printed speech of Treasurer Raines on the expenditures and management of the canals, submitted Apr. 3, 1873. (see N. Y. (state)—Canal board. Proceedings, 1873, p.60-68) 386 N4264

N. Y. (state)—Attorney-General. Opinion on legislative power to limit appropriations for maintenance and repair of canals to specified portions of canal system. 2p. (Ass. doc. 1873, no. 46)

N. Y. (state)—Canal commissioner. Communication relative to structures on eastern division New York state canals, and estimated cost of keeping same in repair, etc. 7p. (Ass. doc. 1873, no. 57)

— Information necessary for those navigating the canals. (see Annual reports, 1869-73) 626 H7

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N. Y. (state)—Canal Department, Auditor of. Report on cost of repairing damages to Genesee Valley, Chemung, Chenango, Crooked Lake, and Black River canals. 2p. (Sen. doc. 1873, no. 83; or, Ass. doc. 1873, no. 131)

Raines, Thomas. Remarks of the State Treasurer before the canal committee of the Assembly, Mar. 20, 1873; also reply to the State Engineer and Commissioners, Apr. 3, 1873. (see N. Y. (state)—Canal board. Proceedings, 1873, p.74-82, 95-104) 386 N4264

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An attack upon the management of the State Engineer and Canal Commissioners.

Taylor, William B. Remarks made before the Assembly canal committee, reply to Mr. Raines' article, "The canals and their management," Mar. 26, 1873. (see N. Y. (state)—Canal board. Proceedings, 1873, p.90-94) 386 N4264

N. Y. (state)—Canals, Committee on. Report on bill in relation to enlarging the powers of the canal board. 3p. (Ass. doc. 1876, no. 62)

N. Y. (state)—Canal Department, Auditor of. Statement regarding opening of canals. 1p. (Ass. doc. 1877, no. 117)

N. Y. (state)—Engineer and Surveyor. Communication relative to number, rank and pay of employees on the canals, eastern division. 3p. (Ass. doc. 1877, no. 40)

N. Y. (state)—Governor. Message. (Ass. doc. 1877, no. 88; or, Ass. jour. 1877, 100:17) Relates to the appointment of a Superintendent of Public Works, with powers of the canal commissioners.

Economical canal management and low tolls. (see Commer. and finan. chron. 1878, 26:104-5) 1600 words. 332 qC73

Editorial urging improved canal equipment.

N. Y. (state)—Canal Department, Auditor of the. Report of opinion whether there may not be a reduction of number of weighmasters and collectors on the canals; also in consultation with the State Engineer, whether the services of the engineers, resident and division, and of the surveyors, may not be dispensed with. 5p. (Ass. doc. 1878, no. 60)

N. Y. (state)—Engineer and Surveyor. Communication as to work of engineering department. 11p. (Ass. doc. 1878, no. 123)

Seymour, Horatio. Methods of doing work on the canal, statement prepared in 1878. 11p. O. 626

Also whether services of division and resident engineers shall be dispensed with.

The Erie canal. (see Amer. R. R. jour. 1879, 52:57)

Management under a canal superintendent, 1878.

620.5 qJ2

N. Y. (state)—Engineer and Surveyor. Objections to the passage of Assembly bill, no. 245, abolishing the office of division and resident engineers. 11p. O. n.p. 1879. 626

Report on estimates of cost for repair and necessary improvements for the canals. 18p. (Ass. doc. 1880, no. 71)

Commerce is the life of the state, a plea for canal improvement; with a digest of the statutes, rules and regulations of the canal department. 16p. Q. n.p. 1881. 386

Business calendar of the canal board, 1878 and 1882. 3 nos. 386

N. Y. (state)—Engineer and Surveyor. Report relative to the abolishment of the offices of division and resident engineers upon the state canals. 13p. (Ass. doc. 1882, no. 63)

N. Y. (state)—Select committee. Report relative to reducing the cost in the management of the canals. 7p. (Sen. doc. 1882, no. 24)

Testimony before committee, 203p. (N. Y. state law lib. pamphlet, v.92).

N. Y. (state)—Canal appraisers. An open letter to the canal board relative to transferring the appellate jurisdiction of the canal board to a court of claims or the supreme court, and the duty of defending the state to the Attorney-General, Jan. 9, 1883. 6p. O. 040 P v.2437

N. Y. (state)—Comptroller. Report to canal board on appointment of collectors of canal tolls. 5p. (Ass. doc. 1883, no. 124)

Seymour, Silas, comp. Department of State Engineer and Surveyor, shall it be abolished? Views submitted Feb. 28, 1883. 41p. O. Alb. 1883. 626

Also in *Annual report of State Engineer and Surveyor for 1883*, p.36-42 (626 L1), and in the volume of pamphlets (040 P v.2438).

Includes statement respecting duties of State Engineer and subordinates, by E. D. Smalley; letters from division engineers, Thomas Evershed, C. A. Beach, D. E. Whitford, and report and statement on subject by Horatio Seymour.

N. Y. (state)—Comptroller. Report of the names of collectors and compilers of statistics relative to the trade and tonnage of the canals for 1882, the compensation paid to each employee, place employed, etc. 10p. (Ass. doc. 1884, no. 53)

N. Y. (state)—Public Works, Superintendent of. Communication concerning the compilers of canal statistics. 1p. (Ass. doc. 1884, no. 49)

- Supplementary communication. 4p. (Ass. doc. 1894, no. 50)
- N. Y. (state)—Public Works, Superintendent of, and Engineer and Surveyor. Communication relative to dangerous condition of Erie canal aqueducts. 2p. (Sen. doc. 1891, no. 67)
- "Canal reform" planks in the platforms adopted by party conventions in New York. (see Eng. news, 1898, 40:216) 620.5 fN4
- Failure of state ownership of canals. Editorial. (see Elect. engr. 1898, 25:30) 500 words. 621.3 qO2
- Lock tenders on the eight-hour law. (see Eng. news, 1899, 42:168) 620.5 fN4
- Unconstitutionality of the eight-hour law. Editorial. (see Eng. news, 1904, 52:523) 1000 words. 620.5 fN4

## CONTRACTS.

- See also Names of canals, Management, Claims, Finances, Investigations, etc.
- N. Y. (state)—Canal commissioners. Communication in compliance with the resolution, Mar. 16, 1819, reporting names of contractors who have not completed their contracts, etc. (see Ass. jour. 1819, 42:710-14)
- N. Y. (state)—Comptroller. Communication in relation to canal contracts. 1p. (Ass. doc. 1821, no. 90)
- N. Y. (state)—Canal commissioners. Report of contracts let for the Oswego canal. (see Sen. jour. 1826, 49:353-55)
- N. Y. (state)—Canals, Committee on. Report on memorial of William Hay, relative to the navigable feeder on the Champlain canal. (see Sen. jour. 1829, 52:210-12)
- Report on petition of Henry Spencer and others relative to the Champlain feeder. (see Ass. jour. 1829, 52:548-49)
- N. Y. (state)—Comptroller. Report, with certain papers relating to the contract between Cady, Case and company, and the canal commissioners. (see Ass. jour. 1829, 52:668-73)
- N. Y. (state)—Canal commissioners. Report on petition of Daniel Stevenson and others, who were sureties for the performance of the canal contract of R. M. Livingston and Thomas Wright. 3p. (Ass. doc. 1830, no. 60)
- N. Y. (state)—Canal board. Report on memorial of Pratt, Watson and company relative to contract for Leland's pond reservoir on Chenango canal. 4p. (Sen. doc. 1837, no. 47)
- The joint committee and the Chenango canal contractors. (see Alb. daily argus, Jan. 26, 1839) 3100 words. 071 xA11
- Critical review. Communicated.
- N. Y. (state)—Canal commissioners. Report relative to amount of work under contract on the Genesee Valley canal, between the Allegheny river and the point where the Dansville side-cut intersects the canal. 3p. (Sen. doc. 1839, no. 2:323)
- Report relative to contracts on the canal. (Ass. doc. 1841, no. 203)
- Report relative to contracts now in force on the canals. 45p. (Ass. doc. 1842, no. 173)
- N. Y. (state)—Comptroller. Report on contracts for enlargement of Erie canal between Albany and West Troy. 2p. (Sen. doc. 1843, no. 15)
- N. Y. (state)—Canal board. Report giving copies of documents relative to the contract for the five combined locks at Lockport. 43p. (Sen. doc. 1844, no. 130)
- N. Y. (state)—Canal commissioners. Report on contracts for enlargement of Erie canal. (Ass. doc. 1844, no. 146)
- N. Y. (state)—Canals, Committee on. Report on petitions of contractors, for some appeal from decisions of canal board. 4p. (Ass. doc. 1844, no. 147)
- N. Y. (state)—Canal board. Report on claim of J. P. Yates for recognition of a verbal agreement for extension of time of contract. 11p. (Ass. doc. 1845, no. 214)
- N. Y. (state)—Canals, Committee on. Report on petitions of contractors, for some appeal from decisions of canal board. 2p. (Ass. doc. 1845, no. 48)
- N. Y. (state)—Canal commissioners. Report on abandonment of contracts, West Jordan level, and consequent loss to state. 2p. (Ass. doc. 1846, no. 88)



**N. Y. (state)—Canals, Committee on.** Report concerning the contract system of making canal repairs.

25p. Sen. doc. 1846, no. 104

5p. Ass. doc. 1846, no. 173

**N. Y. (state)—Canal board.** Report relative to the testimony taken in the case of Briggs Thomas and E. C. Worden, contractors for section 17, Genesee Valley canal. 6p. (Ass. doc. 1847, no. 34)

**N. Y. (state)—Canal commissioners.** Report as to the amount of work put under contract during recess on Erie canal enlargement and the completion Genesee Valley and Black River canals. 8p. (Ass. doc. 1847, no. 208)

— Report of commissioner of eastern division of Erie canal on operation of "act in relation to public works," contracts, etc. 12p. (Sen. doc. 1847, no. 125)

**N. Y. (state)—Canals, committee on.** Report on substitution of contract system of repairs. 62p. table. (Sen. doc. 1847, no. 63)

Minority report, 14p. (Sen. doc. 1847, no. 79).

**N. Y. (state)—Canal board.** Report on contracts for proposed work on Erie and Ohio basins, Buffalo. 4p. (Sen. doc. 1849, no. 26)

**N. Y. (state)—Canal commissioners.** Communication in relation to canal contracts. 2p. (Ass. doc. 1853, no. 18)

**N. Y. (state)—Canals, Committee on.** Report of the majority on the amendments to the constitution. 7p. (Ass. doc. 1853, no. 98)

Recommends distributing appropriations authorized for canals in equal annual amounts; also that law of 1851 concerning contracts be repealed.

Enlargement of Erie canal. (see Amer. R. R. jour. 1854, 27:671)

620.5 qJ2

Statement of work to be done and conditions of awarding contracts.

**N. Y. (state)—Canal board.** Report on condition of work under certain contracts. 7p. (Sen. doc. 1854, no. 83)

**N. Y. (state)—Canal Department, Auditor of.** Statement of final account on contract for Black river improvement. 8p. (Sen. doc. 1854, no. 79)

**N. Y. (state)—Canal board.** Report relative to lettings on Black River canal with testimony. 39p. (Ass. doc. 1855, no. 8)

**N. Y. (state)—Canals, Committee on.** Report on the subject of contracting the repairs on the canals. 4p. (Sen. doc. 1855, no. 73)

**N. Y. (state)—Engineer and Surveyor.** Report on condition of canal contracts between Lockport and Penileton. 7p. (Ass. doc. 1855, no. 58)

**N. Y. (state)—Canal board.** Majority and minority reports relative to the enlargement of the canals, to contracts therefor, and sufficiency of means for that purpose. 26p. (Ass. doc. 1856, no. 191)

Re

— Report on work done, the statistics furnished under contracts. 7p. (Ass. doc. 1856, no. 169)

Report re

**N. Y. (state)—Attorney-General.** In relation to condition of suits relative to bonds for canal contracts. 2p. (Ass. doc. 1857, no. 16)

**N. Y. (state)—Canal Department, Auditor of.** Report on contractors failing to keep canals in repair. 1p. (Ass. doc. 1859, no. 160)

— Reply to resolution of inquiry. 1p. (Ass. doc. 1859, no. 161)

**N. Y. (state)—Canal commissioners.** Report on abandonment of repair contract of James Oswald and D. A. Van Valkenburgh. 3p. (Ass. doc. 1862, no. 123)

**N. Y. (state)—Contracting board.** Communication from clerk, transmitting copies of repair contracts on eastern division Erie canal. 83p. (Sen. doc. 1863, no. 22)

**N. Y. (state)—Engineer and Surveyor.** Special report relative to canal contracts. 49p. (Ass. doc. 1865, no. 95)

**N. Y. (state)—Canal Department, Auditor of.** Report on alleged irregularities in letting repair contracts on Champlain canal. 12p. (Ass. doc. 1866, no. 105)

— Report on alleged payment of moneys to contractors on Oneida Lake canal for work not performed. 2p. (Ass. doc. 1866, no. 84)

**N. Y. (state)—Engineer and Surveyor.** Report relative to canal contracts. 4p. (Sen. doc. 1866, no. 14)

N. Y. (state)—Canal commissioners. Report on non-fulfilment of repair contracts. 14p. (Sen. doc. 1867, no. 53)

Certificates of division engineer, eastern division, relative to performance of work. 4p. (Sen. doc. 1868, no. 78)

N. Y. (state)—Attorney-general. Correspondence with contracting board on canal repair contract letting of Dec. 28, 1866. 12p. (Sen. doc. 1868, no. 26)

N. Y. (state)—Canal Department, Auditor of. Communication transmitting certificates of division engineer, eastern division, relative to performance of contract work. 4p. (Sen. doc. 1868, no. 78)

N. Y. (state)—Canals, Committee on. Minority report on abolition of canal contracts. 4p. (Sen. doc. 1868, no. 35)

Davis, E. E. Speech on administration of the affairs of the canals. (*see* Commercial union of the state of New York. Proceedings of state convention. 1870. p.55-59)

040 P v.2124

Against repair contract system.

Fish, Henry L. Speech on canal management and contract system. (*see* Commercial union of the state of New York. Proceedings of state convention. 1870. p.59-65)

040 P v.2124

Mitchell, David J. Speech against the repair contract system. (*see* Commercial union of the state of New York. Proceedings of the state convention. 1870. p.70-75)

040 P v.2124

N. Y. (state)—Canal board. Report of committee relative to the settlement with contractors whose contracts have been surrendered or canceled under the provisions of chapter 55 of the laws of 1870. (*see* Proceedings, 1870, p. 190-94)

386 N4264

N. Y. (state)—Canals, Committee on. Report of minority on the bill abolishing the contract system of canal repairs. 5p. (Ass. doc. 1870, no. 125)

Canal contractors. Editorial. (*see* Commer. and finan. chron. 1875, 20:301-2) 1300 words.

332 qC73

N. Y. (state)—Canal board. Report on securities deposited by contractors. 4p. (Sen. doc. 1875, no. 76)

N. Y. (state)—Canal Department, Auditor of the. Communication relating to contracts for new enlargement, or extraordinary work upon the canals of the state. 3p. (Ass. doc. 1875, no. 40)

N. Y. (state)—Engineer and Surveyor. Report on contracts for extraordinary repairs. 148p. O. (in annual report for 1876, Appendix)

626 L1

N. Y. (state)—Governor. Memoranda filed with Assembly bill, no. 493, entitled "an act to provide for the completion or cancellation of all pending contracts for new work upon and extraordinary repairs of the canals; and making an appropriation to pay the expenses of such necessary extraordinary repairs as may be approved of and directed by the canal board," 1876. (*see* Tilden, S. J. Writings and speeches. 1885, 2:323-28)

308 T45

N. Y. (state)—Public works, Superintendent of. Report showing bids and awards of contracts, 1888-89. 37p. (Ass. doc. 1890, no. 61)

386

New York state canals improvement; purpose and nature of improvement. (*see* Eng. news, 1897, 38:155-57)

620.5 fN4

Gives table of contractors and contract prices and profiles of Erie, Oswego and Champlain canals. Progress of improvement. Illustrated.

Argument of J. A. Roberts, State Comptroller, for suspension of work on outstanding Erie canal contracts, till an added appropriation is secured, with additional comment. (*see* Eng. news, 1898, 39:24-25, 288)

620.5 fN4

N. Y. (state)—Governor. Message relative to canals. 4p. (Sen. doc. 1899, no. 45 and Ass. doc. 1899, no. 61)

Transmits letter of counsel appointed to take up the matter of charges in reference to canal contracts under acts of 1895 and 1896.

N. Y. (state)—Public Works, Superintendent of, and Engineer and Surveyor. Communication relative to canal contracts. 7p. (Sen. doc. 1899. no. 34)

N. Y. (state)—Canals, Committee on, 1899. Memorandum on method of bidding to prevent unbalanced bids. (*see* *its* Report. 1900, p.117-26)

386 N42

In Ass. doc. 1900, no. 79.

- Anti-bond monopoly. *passim*. Plea for small-sized contracts on the New York barge canal. (see Eng. news, 1904, 52:424) 320 words. 620.5 fN4
- Editorial on the advertisement of the first contracts for the New York barge canal. (see Eng. news, 1904, 52:270,485) 360 words. 620.5 fN4
- Editorial on the first six of the barge canal contract bids. (see Eng. news, 1904, 52:575) 800 words. 620.5 fN4
- Lee, George W. Reply to "anti-bond monopoly" on the awarding of Erie canal contracts. (see Eng. news, 1904, 52:448) 500 words. 620.5 fN4
- New York canal improvements. (see Eng. rec. 1904, 50:731) 620.5 fN7
- Brief editorial on the bids for first contracts, with reference to the itemized summaries to be found in *Eng. Rec.* 50:43-44.
- Advisory board of consulting engineers; report relating to the advisability of accepting unit-price bids. (see Eng. news, 1905, 53:238) 1000 words. 620.5 fN4
- Lump-sum and unit-price contracts. Editorial. (see Eng. rec. 1905, 51:146-47) 1000 words. 620.5 fN7
- Lump-sum vs. unit-price bidding. (see Eng. news, 1905, 53:17-18) 2500 words. 620.5 fN4
- Why contractors favor itemized bidding in New York barge canal work.
- N. Y. (state)—Attorney-general. Opinion on barge canal law, chapter 147, laws of 1903, given Mar. 8, 1905. 20p. O. Alb. 1905. (Law pamphlet no. 212.) N. Y. state law lib.
- New York barge canal contracts held up for decision on whether bidders can submit both lump and itemized bids on same contract and on constitutionality of barge canal act. (see Eng. news, 1905, 53:45) 160 words. 620.5 fN4

### CLAIMS.

- References for individuals' claims are omitted. See also Annual reports, etc.
- N. Y. (state)—Canal commissioners, acting. Report relative to instances where greater sums have been allowed to contractors than the original contract price. 4p. (Ass. doc. 1824, no. 91; or, Ass. jour. 1824, 47:503-6)
- Report respecting the appraisement of damages on Erie and Champlain canal. (Ass. doc. 1827, no. 180; or, Ass. jour. 1827, 50:803-5)
- N. Y. (state)—Attorney-General. Report upon the construction of the law as to extra allowance to canal contractors. 3p. (Ass. doc. 1828, no. 189; or, Ass. jour. 1828, 51:801-3)
- An act in relation to the appraisal of damages on the canals, and for other purposes, passed May 4, 1829. (see Laws of New York)
- N. Y. (state)—Canal commissioners. Report on resolution of Assembly relative to canal claims. 9p. (Ass. doc. 1838, no. 201)
- N. Y. (state) Canals, Committee on. Report on Assembly bill relative to appraisal of property taken for enlarged Erie canal. 10p. (Sen. doc. 1839, no. 108)
- N. Y. (state)—Attorney-General. Opinion as to appraisal of damages on unfinished canals. 7p. (Sen. doc. 1844, no. 116)
- Opinion as to payment of private claims from Chenango canal tolls. 6p. (Sen. doc. 1844, no. 14)
- N. Y. (state)—Canal board. Report on propriety of granting claimants right of *certiorari* to supreme court. 5p. (Sen. doc. 1848, no. 48)
- N. Y. (state)—Canal appraisers. Report of all claims allowed for damages. 85p. (Sen. doc. 1849, no. 14)
- On appeal to the Canal board from Canal appraisers, Seneca river improvement, in the claim of Elihu Parry regarding the flooding of his land. 6p. O. n.p., n.d. 040 P v.1947
- Bogart, William H. *comp.* Digest of claims presented to the Legislature, 1844-50. 283p. (Sen. doc. 1851, no. 5)
- N. Y. (state)—Canal Department, Auditor of. Digest of claims presented to canal board from organization to Mar. 1, 1851. 47p. (Sen. doc. 1851, no. 50) 040 P v.1235
- N. Y. (state)—Canals, Committee on. Report on bill authorizing award of damages by canal appraisers. 3p. (Sen. doc. 1851, no. 73)

N. Y. (state)—Canal appraisers. Report in answer to a resolution of Feb. 17, for a statement of all claims for damages, both decided and undecided. 2p. (Ass. doc. 1853, no. 47)

N. Y. (state)—Claims, Committee on. Report on petition for a law for the settlement of claims arising under canal contracts. 3p. (Sen. doc. 1853, no. 58)

——— Report on the general bill entitled "an act for the final settlement of disputed and doubtful claims against the state." 2p. (Ass. doc. 1853, no. 87)

Bogart, William H. *comp.* Digest of claims presented to the Legislature of 1853. 50p. (Sen. doc. 1854, no. 51)

——— of 1854. 79p. (Sen. doc. 1855, no. 11)

——— of 1855. 67p. (Sen. doc. 1856, no. 109)

N. Y. (state)—Canal appraisers. Awards and testimony in the claims of the Rochester mill owners for the diversion of the waters of the Genesee river for the supply of the Erie and Genesee Valley canals, transmitted to the Legislature, Mar. 5, 1856. 287p. illus. 1 map. (Sen. doc. 1856, no. 103) 386 N424

Page, H. C. *comp.* Digest of claims pending in 1855. 93p. (Ass. doc. 1856, no. 14)

N. Y. (state)—Finance, Committee on. Report on awards of canal appraisers to Rochester mill owners relative to the diversion of the waters of the Genesee river. 6p. (Sen. doc. 1857, no. 79)

N. Y. (state)—Canal appraisers. Testimony in the claims of the citizens in the Ausable river for damages occasioned by the breaking away of the dam across the south branch of the Ausable, Sept. 30, 1856, transmitted to the canal board. 368p. 2 maps, O. Alb. 1858.

386 N424 v.2

N. Y. (state)—Attorney-General. Opinion on liability of state for damages from logs floating over dams in Sacandaga river. 4p. (Ass. doc. 1859, no. 162)

——— Opinion on state's liability for damages arising from raised grade of embankments leading to new bridges of enlarged canal. 2p. (Sen. doc. 1860, no. 59)

N. Y. (state)—Governor. Messages.

Ass. jour. 1860, 83:13-14 Ass. jour. 1867, 90:33-36

" 1861, 84:15 " 1873, 96:17-18

" 1862, 85:13-14 " 1882, 105:70

" 1863, 86:92 " 1894, 117:20-21

Canal damage claims.

N. Y. (state)—Canals, Committee on. Report on Black River canal claims. 5p. (Sen. doc. 1861, no. 51)

An argument submitted before the Canal appraisers, Apr. 8, 1862, on the claim of Lewis Benedict for damages by the destruction of his store at Rochester. 53p. O. Alb. 1862.

040 P v.1947

N. Y. (state)—Canal appraisers. Report on number of claims and awards, 1851-62, 3p. (Sen. doc. 1862, no. 24)

N. Y. (state)—Canal Department, Auditor of. Digest of those canal claims, presented to and acted on by canal board, 1860-61. 6p. (Sen. doc. 1862, no. 7)

——— Report on number and amount of awards made by canal appraisers, 2p. (Sen. doc. 1862, no. 19)

N. Y. (state)—Canal appraisers. Construction put upon the statutes defining the duties of canal appraisers. (*see* Annual report for 1864, p.3-22) 386 N424

——— Proposed amendment of the statute (1st R. S. 4th ed., p.484, sec. 79) in regard to the presentation of claims and appeals. (*see* Annual report for 1865, p.6-13)

N. Y. (state)—Canal Department, Auditor of. Statement of awards and allowances to contractors and others, for damages etc., 1854-65. 30p. (Ass. doc. 1866, no. 61)

——— Report on awards for damages, 1865-6. 20p. (Ass. doc. 1867, no. 43)

N. Y. (state)—Attorney-General. Opinion on question whether two-thirds vote is required for passage of claim bills. 3p. (Ass. doc. 1869, no. 151)

N. Y. (state)—Judiciary, Committee on. Report on question whether two-thirds vote is required for passage of claim bills. 4p. (Ass. doc. 1869, no. 153)

Minority report of, 3p. (Ass. doc. 1869, no. 154).

N. Y. (state)—Canal appraisers. Statement of claims for damages since Jan. 1, 1870. 56p. (Ass. doc. 1872, no. 45)

N. Y. (state)—Canal Department, Auditor of. Statement of bills for services rendered in connection with Black River canal claims. 22p. (Sen. doc. 1872, no. 89)

N. Y. (state)—Canal appraisers. Statement of awards for damages on Oneida lake and river. 9p. (Ass. doc. 1873, no. 39)

N. Y. (state)—Canal Department, Auditor of. Report in relation to awards made by the canal appraisers for canal damages, with amount of attorneys' fees paid, 1868-74. 4p. (Ass. doc. 1874, no. 89)

— Report on the exact amount of awards made by the canal appraisers for canal damages, 1870-73. 2p. (Ass. doc. 1874, no. 62)

N. Y. (state)—Canal appraisers. Response to resolution of the Assembly as to unsettled canal claims. 17p. (Ass. doc. 1878, no. 71)

N. Y. (state)—Governor. Memoranda filed with Assembly bill, no. 275, entitled, "an act to reappropriate moneys for the payment of awards made by the canal appraisers, and expenses attending the same, and the payment of awards by the canal board," 1876. (see Tilden, 8: J. Writings and speeches, 1885, 2:336) 308 T45

### FINANCES.

See also Annual reports, Articles on construction and history of more than one canal, names of canals, basins, harbors and rivers, Investigations, Canal tolls, etc.

Schuyler, Gen. Philip John. Remarks on the revenue of the state of New York. 24p. O. Alb. 1796. 336.747 Sch8

References to loans to canal companies, p.15 and 24.

N. Y. (state)—Comptroller. Report relative to expenditures of canal commissioners. (Ass. jour. 1816, 39:660-62)

Report of the joint committee on the subject of canals. (see Alb. argus, Mar. 25, 1817) 5500 words. 071 xAl

Purchase of the Western lock navigation company; establishment of canal construction fund; to borrow \$1,000,000 on credit of said fund; taxation of salt and auction sales for benefit of fund.

N. Y. (state)—Comptroller. Report relative to the several sums of money which have from time to time been appropriated for the improvement of the navigation of Hudson's river. (see Ass. jour. 1818, 41:388-92)

An act relative to the appropriation of the avails of the sales of Grand Island for the construction of the Erie and Champlain canals, passed Apr. 14, 1820. (see Laws of New York)

Tibbitts, George. Extract of a letter, June 13, 1828. (see Hosack, David. Memoir of DeWitt Clinton. 1829. Appendix, p.487-91) 923.27 qC61

Gives data on early history of the canal, especially upon the measures of finance, in which he took an active part in the Legislature.

Accompanied by a letter from Wheeler Barnes to Elkanah Watson, Apr. 12, 1820, presenting Mr. Tibbitts' part in maturing the scheme of finance in 1817.

N. Y. (state)—Canal commissioners. Report on modification of the local tax on lands adjacent to the canals. (see Ass. jour. 1820, 43:665-78)

Also in *Public documents* compiled by C. G. Haines, p.373-400 (386 H 12).

N. Y. (state)—Canal fund, Commissioners of the. Communication regarding a deed of cession to the people of this state from James Hornby for 3000 acres of land in the county of Steuben. (see Ass. jour. 1820, 43:216)

— Report on petition for drawback or reduction of one-half the duty of salt manufactured in the western district. (see Ass. jour. 1820, 43:559)

N. Y. (state)—Canals, Committee on. Report concerning the raising of a tax on lands adjacent to the canals and concerning the disbursements of money exclusively upon the eastern section of the Erie canal and the southern parts of the Champlain canal until the same are completed. Mar. 14, 1820. 33p. O. Alb. 1820. 040 P v.223

Also in an unbound pamphlet (386).

An act directing the canal commissioners to levy and collect the local tax, on the route of the great canals. 1p. (Ass. doc. 1821, no. 36)

The canal. (see Alb. gazette and daily advertiser, Feb. 20, 1821) 1800 words.

N. Y. state lib.

Communication on canal revenues.

N. Y. (state)—Comptroller. Report on compensation paid to the several appraisers on the Erie and Champlain canals. 2p. (Ass. doc. 1821, no. 128; or, Ass. jour. 1821, 44:300-1)

- Erie canal. (*see* Alb. daily advertiser, Mar. 18, 1822) 800 words. N. Y. state lib.  
Communication concerning cost of construction.
- The canal tax. (*see* Alb. daily advertiser, Apr. 2, 1823) 800 words. N. Y. state lib.  
Signed "Ontario." Concerning proposed revival of tax on lands adjoining the canal.
- Canals. (*see* Alb. daily advertiser, Mar. 20, 1823) 700 words. N. Y. state lib.  
Signed "Calculator." Forecasts of probable income of Erie canal.
- N. Y. (state)—Canal fund, Commissioners of. Report relative to amount of funds at their disposal, where deposited, etc. 4p. (Ass. doc. 1823, no. 168)
- N. Y. (state)—Canal commissioners. Report concerning employees and expenditures on the Erie and Champlain canals. 7p. (Ass. doc. 1824, no. 175; or, Ass. jour. 1824, 47:896-902)
- N. Y. (state)—Canal fund, Commissioners of the. Communication relative to the amount of money borrowed on the credit of the state. (*see* Ass. jour. 1824, 47:1177-78)
- Report relative to a repeal of the local canal tax. (Ass. doc. 1824, no. 20; or, Ass. jour. 1824, 47:625-26)
- N. Y. (state)—Comptroller. Statement of moneys paid during the last fifteen years for the improvement of the navigation of Hudson's river. (Sen. doc. 1824, no. 140; or, Sen. jour. 1824, 47:247-51)
- An act concerning the Erie and Champlain canals, passed Apr. 21, 1825. (*see* Laws of New York)
- Authorizes commissioners to borrow money.
- An act to establish a sinking fund, for the speedy extinguishment of the canal debt. 2p. (Ass. doc. 1825, no. 126)
- N. Y. (state)—Canal fund, Commissioners of the. Full and detailed statement of all the loans effected for the construction of the canals. (Sen. doc. 1825, no. 91; or, Sen. jour. 1825, 48:109-11)
- Includes date given, time irredeemable and amount of premiums received; also whole amount of receipts during the last year appropriated to pay canal loans.
- Report on the bill for establishing a sinking fund for extinguishment of the canal debt. 2p. (Ass. doc. 1825, no. 125)
- The canal fund. (*see* Alb. daily advertiser, Apr. 7, 1826) 1000 words. N. Y. state lib.
- N. Y. (state)—Canal fund, Commissioners of the. Report relative to repeal of seventh section of "act respecting navigable communications between the great western and northern lakes and the Atlantic ocean," passed Apr. 15, 1817. (*see* Sen. jour. 1826, 49:570-71)
- Against local tax of \$250,000 for completing the canals.
- Beck, Nicholas F. *anon.* Canal revenue. (*see his* Considerations in favor of the construction of a great state road from Lake Erie to the Hudson. 1827, p. 40-42) 386 B38
- The canals and their results. (*see* Alb. argus and gazette) 071 xA11  
Feb. 26, 1827. 1200 words.  
Feb. 28, 1827. 700 words.
- N. Y. (state)—Canal fund, Commissioners of the. Report relative to surplus revenues. (Sen. doc. 1827, no. 99; also Sen. jour. 1827, 1st sess. 50:229-31)
- N. Y. (state)—Comptroller. Communication relative to receipts from the canal fund and disbursements on the canal for 1826. 8p. (Sen. doc. 1827, no. 96; or, Ass. doc. 1827, no. 93)
- Statement of amount paid out of the treasury under the act to provide for the survey of a land communication between Lake Erie and the Hudson river, passed Apr. 20, 1825, showing to whom and for what particular service the same may have been paid. (*see* Sen. jour. 1827, 1st sess. 50:71-78)
- An act making a further appropriation for the Champlain feeder, passed Apr. 21, 1828. (*see* Laws of New York)
- N. Y. (state)—Comptroller. Report relative to the compensation of the canal commissioners. 2p. (Ass. doc. 1828, no. 104)
- Report relative to the expenditure of moneys on the canals. 163p. (Ass. doc. 1828, no. 23)
- N. Y. (state)—Select committee. Report relative to the expenditure of moneys on the canals. 4p. (Ass. doc. 1828, no. 250)
- N. Y. (state)—Comptroller. Report as to moneys belonging to canal fund over expenditures. (Ass. doc. 1829, no. 82; or, Ass. jour. 1829, 52:406)

N. Y. (state)—Comptroller. Report relative to amount of moneys paid towards the Champlain feeder, and contracts on file for construction of said work. (*see* Ass. jour. 1829, 52:534-38).

——— Statement of amount paid to the canal appraisers from Apr. 21, 1825 to Nov. 30, 1828. (Sen. doc. 1829, no. 56; or, Sen. jour. 1829, 52:131-33)

——— Statement of moneys received from the Erie and Champlain canal fund, exclusive of loans, from 1817 to Jan. 29, 1829. (*see* Ass. jour. 1829, 52:353-54)

N. Y. (state)—Expenditures, Committee on. Report on the Comptroller's report in relation to the accounts of the canal appraisers. 2p. (Sen. doc. 1829, no. 57; or, Sen. jour. 1829, 52:147-48, 234)

Tibbitts, George. Finances of the canal fund of the state of New York, examined in a letter to Stephen Allen and G. B. Throop. 24p. O. Alb. 1829. 386 T43

Deals with the investment of surplus revenues of the canal fund.

N. Y. (state)—Canal board. Report of the expenditures, by the superintendents employed on the Erie and Champlain canals during the last year. 4p. (Sen. doc. 1830, no. 243)

N. Y. (state)—Comptroller. Report relative to the amount of compensation paid to the canal appraisers. 5p. (Ass. doc. 1830, no. 28)

——— Report relative to the loan of the credit of the state to the Neversink navigation company. 14p. (Ass. doc. 1830, no. 49)

N. Y. (state)—Finance, Committee on. Report on Assembly bill to release S. Barnum and H. Howell from a judgment against them as sureties on the bond of the Neversink Navigation company. 2p. (Sen. doc. 1832, no. 111)

N. Y. (state)—Senate. Resolution proposing an amendment to the constitution. 1p. (Sen. doc. 1832, no. 70 and 100)

Canal loans. (*see* Amer. R. R. jour. 1833, 2:353) 620.5 qJ2

From the *Albany argus*. Brief notice of offers for the Chenango and Chemung loans.

N. Y. (state)—Canal fund, Commissioners of. Communication relative to deficiencies in revenues of Chemung canal. 2p. (Ass. doc. 1833, no. 331)

——— Communication relative to loans for the construction of the Chenango canal. 3p. (Sen. doc. 1833, no. 120)

——— Report relative to receipts and expenditures on Erie and Champlain canals. 5p. (Sen. doc. 1833, no. 38)

——— Report, requiring information as to contingent expenses of the board and an allowance of a counsel fee of \$100. 4p. (Ass. doc. 1833, no. 270)

N. Y. (state)—Comptroller. Circular to the holders of Erie and Champlain canal stocks, which are reimbursable in 1837. (*see* Niles' register, 1833, 45:60) 500 words. 305 qN59

——— Report giving statement of appropriations and expenditure for improvement of Hudson river. 4p. (Ass. doc. 1833, no. 302)

New York canals. (*see* Amer. R. R. jour. 1834, 3:197) 250 words. 620 qJ2

Canal fund should be used for redemption of canal debt.

Chenango canal loans. (*see* Niles' register, 1835, 48:411) 150 words. 305 qN59

Offers for the loan.

N. Y. (state)—Comptroller. Report relative to loans for construction of Chenango canal. 5p. (Ass. doc. 1835, no. 381)

Erie and Champlain canal debt. (*see* Niles' register, 1836, 50:370-71) 800 words. 305 qN59

"A gratifying statement" about the revenues, investments, etc.

N. Y. (state)—Comptroller. Report on petition of I. Packard for new certificate of canal stock to replace lost one. 2p. (Ass. doc. 1836, no. 48)

N. Y. (state)—Senate. Resolutions offered by J. P. Jones relative to Erie, Oswego and Champlain canals. 2p. (Sen. doc. 1836, no. 59)

——— Resolution offered by Mr. Maison, proposing an amendment to the constitution relative to canal revenues. 1 p. (Sen. doc. 1836, no. 48)

N. Y. (state)—Ways and means, Committee on. Report on bill levying tax on banks, for more speedy enlargement of Erie canal. 2p. (Ass. doc. 1837, no. 316)

Payment of the canal debt. Editorial. (*see* Alb. daily argus, July 19, 1837) 2000 words. 071 xAll

- The accounts of the canal commissioners. Editorial. (*see* Alb. daily argus, Dec. 22, 1838) 6600 words. 071 xAll
- N. Y. (state)—Ways and means, Committee on. Report on the United States deposit fund, and also on the recommendation of the Comptroller suggesting the levy of a direct tax. 37p. (Ass. doc. 1838, no. 242)
- Also in *American railroad journal*, 1839, 8:53-62, 79-92, 102-3, 7000 words (620.5 J2).
- Report upon the finances and internal improvements of the state of New York, 1838. 656p. O. n. p. n. d. 386
- Reprinted at Boston.
- The canal expenditures. (*see* Alb. daily argus, Jan. 12, 1839) 1600 words. 071 xAll
- Reviews administration of canal finances. Editorial.
- Did the Erie canal create the auction and salt duties? (*see* Alb. daily argus, June 19, 1839) 2400 words. 071 xAll
- Erie canal enlargement. (*see* Alb. daily argus, Feb. 23, 1839) 800 words. 071 xAll
- Communication on the probable cost.
- Expenditures on the canals. (*see* Alb. daily argus, Jan. 18, 1839) 300 words. 071 xAll
- Editorial on the Comptroller's annual report.
- Future revenue of the Erie canal. (*see* Amer. R. R. jour. 1839, 9:239-93) 1200 words. 620.5 J2
- Internal improvements. (*see* Alb. daily argus, Feb. 20, 23 and 28, 1839) 800, 800 and 1300 words. 071 xAll
- Signed "Sennex." Examination of state finances; moderation in canal construction.
- N. Y. (state)—Canal commissioners. Report relative to the cost of the Erie canal enlargement. 32p. (Ass. doc. 1839, no. 339)
- N. Y. (state)—Canal fund, Commissioners of. Report giving unclaimed items of interest on canal stock in Manhattan bank. 10p. (Ass. doc. 1839, no. 134)
- N. Y. (state)—Finance, Committee on. Report on resolution by Mr. Verplanck requesting report on expenditure for internal improvements. 13p. (Sen. doc. 1839, no. 101)
- N. Y. (state)—Senate. Resolution by Mr. Verplanck requesting report on expenditure for internal improvement. 1p. (Sen. doc. 1839, no. 64)
- N. Y. (state)—Ways and means, Committee on. Report on resolution relative to canal accounts since 1830. 13p. (Ass. doc. 1839, no. 388)
- Report upon the finances and internal improvements of the state of New York, 1838. 65p. O. Bost. 1839. 386
- Reprinted for the benefit of the friends of the Western railroad.
- Revenues and trade of the canals. Editorial. (*see* Alb. daily argus, Mar. 9, 1839) 1400 words. 071 xAll
- What the Erie canal has paid. (*see* Alb. evening jour. June 10, 1839) 300 words. N. Y. state lib.
- From *Buffalo advertiser and journal*.
- Review of sources and amount of revenue.
- Loans for the enlargement of the Erie canal. Editorials. (*see* Alb. daily argus, Feb. 17 and 18, 1840) 1200 and 1300 words. 071 xAll
- N. Y. (state)—Assembly. Resolution concerning payment of certain moneys by the Comptroller to canal contractors. 2p. (Ass. doc. 1840, no. 66)
- N. Y. (state)—Canal board. Report respecting the canal debts and revenues, and the enlargement of the Erie canal, etc. 51p. (Ass. doc. 1840, no. 306)
- N. Y. (state)—Canal fund, Commissioners of the. Regulations respecting the issue and transfer of certificates of stock issued by the state of New York and also respecting the payment of interest on such certificates, made July 27, 1840. 16p. O. Alb. 1840. 040 P v.1224
- Report agreeable to a resolution of the House, of Jan. 30, 1840, requesting them to communicate their annual report. 1p. (Ass. doc. 1840, no. 69)
- Report in what banks the money pledged for the redemption of the canal debt, etc., is deposited. 6p. (Sen. doc. 1840, no. 62)
- Report relative to deposits, etc., of the \$500,000 loan. 8p. (Ass. doc. 1840, no. 224)



N. Y. (state)—Canal fund, Commissioners of. Report respecting the expenditure of the 0,000 appropriation. 14p. (Ass. doc. 1840, no. 331)

N. Y. (state)—Ways and means, Committee on. Report relative to deficiency of funds to pay damages awarded on the Chenango canal. 6p. (Ass. doc. 1840, no. 302)

N. Y. (state)—Canal fund, Commissioners of. Report in relation to notices of redemption of stock, etc. 7p. (Sen. doc. 1841, no. 55)

N. Y. (state)—Assembly. Resolution of Mr. Hoffman calling for statement of debt. 7p. (Ass. doc. 1842, no. 23)

N. Y. (state)—Canal fund, Commissioners of. Report respecting the loan for the Chemung canal. 5p. (Sen. doc. 1842, no. 69)

N. Y. (state)—Comptroller. Report in relation to canal revenues. 4p. (Sen. doc. 1842, no. 16)

——— Report relative to premiums paid on the stocks of 1845, and loans of canal fund moneys to the banks. 11p. (Sen. doc. 1842, no. 62)

——— Report of amount of premiums received on the stocks issued for the construction of the Chemung and Chenango canals, and to what purpose they were applied. 1p. (Sen. doc. 1842, no. 87)

N. Y. (state)—Comptroller, commissioners of the canal fund and canal commissioners. Report on debt. 41p. (Ass. doc. 1842, no. 64)

N. Y. (state)—Ways and means, Committee on. Report on so much of the Governor's message as relates to the finances of the state. 65p. (Ass. doc. 1842, no. 88)  
Minority report, 36p. (Ass. doc. 1842, no. 166).

N. Y. (state)—Canal commissioner. Report on amount needed to finish Black River canal. 26p. (Sen. doc. 1843, no. 49)

——— Report on expenditures for canal aqueduct across Schoharie creek. 8p. (Sen. doc. 1843, no. 94)

N. Y. (state)—Canal fund, Commissioners of. Report on finances. 23p. (Sen. doc. 1843, no. 70)

——— Report on loan to certain banks. 37p. (Sen. doc. 1843, no. 92)

N. Y. (state)—Comptroller. Report of expenditures, sections 1-14, Erie canal enlargement. 39p. (Sen. doc. 1843, no. 35)

——— Report on amount of money required to be raised for canal and state purposes. 4p. (Ass. doc. 1843, no. 167)

——— Report on appropriations for internal improvements, and amount of stock issued, etc., 1835-42. 22p. (Ass. doc. 1843, no. 65)

——— Statement as to services rendered by non-acting canal commissioners and payments therefor, 1836-42. 7p. (Sen. doc. 1843, no. 45)

——— 1828-42 5p. (Sen. doc. 1843, no. 80)

N. Y. (state)—Select committee. Report on memorial of convention of democratic delegates relative to creation of state debt by Legislature. 12p. (Ass. doc. 1843, no. 152)  
Minority report, 8p. (Ass. doc. 1843, no. 153).

N. Y. (state)—Canal board. Report on allowances to contractors, etc. 37p. (Sen. doc. 1844, no. 117)

N. Y. (state)—Canal commissioner. Report of acting commissioner in charge on cost of completion, etc. of Genesee Valley canal. 6p. (Sen. doc. 1844, no. 111)

——— Report of expenditures on Jordan level of Erie canal enlargement. 7p. (Sen. doc. 1844, no. 129)

——— Report on estimating for completion of Genesee Valley canal. 9p. (Sen. doc. 1844, no. 112)

——— Report on number, compensation, etc. 11p. 9 tables. (Sen. doc. 1844, no. 69)

N. Y. (state)—Canal fund, Commissioners of. Report. 3p. 11 tables. (Ass. doc. 1844, no. 120)

Tables of the receipts and payments of all the canals to 1843.

N. Y. (state)—Canals, Committee on. Report. 61p. (Sen. doc. 1844, no. 98)

Reviews canal policy of the state. Opposes further investment for completion of canals on the ground that advantages gained are not worth the expense; impossible to continue work without taxation, which is unjust.

- N. Y. (state)—Joint committee. Report of an examination of the accounts of the treasurer and the canal department. 18p. (Ass. doc. 1844, no. 10)
- N. Y. (state)—Ways and means, Committee on. Report on canal finances. 37p. (Ass. doc. 1844, no. 185)
- Minority reports, 55 and 14p. (Ass. doc. 1844, no. 186 and 188).
- N. Y. (state)—Canal commissioners. Report on claim of C. J. Hill for a sum of money expended by him in Rochester for the benefit of the Erie canal. 2p. (Ass. doc. 1845, no. 209)
- Report on clerk hire. 7p. (Sen. doc. 1845, no. 19)
- N. Y. (state)—Canals, Committee on. Minority report on canal appropriations. 8p. (Sen. doc. 1845, no. 110)
- N. Y. (state)—Comptroller. Report on indebtedness of Erie railway and Delaware and Hudson canal company to state. 3p. (Ass. doc. 1845, no. 155)
- Report on issue and redemption of state canal bonds, with seventeen tables. 26p. (Ass. doc. 1845, no. 175)
- Report on payments to canal appraisers and non-acting commissioner. 4p. (Sen. doc. 1845, no. 38)
- Report relative to pay of canal appraisers, 1836 and 1844. 4p. (Sen. doc. 1845, no. 74))
- N. Y. (state)—Governor. Veto of canal bill. 31p. (Ass. doc. 1845, no. 251)
- N. Y. (state)—Joint committee. Report of an examination of the accounts of the Treasurer, and the canal and banking departments. 35p. (Ass. doc. 1845, no. 4) 386 N426
- The state works of New York. (see Amer. R. R. jour. 1845, 18:154) 620.5 qJ2
- Summary view by the Comptroller, with editorial comment.
- N. Y. (state)—Canal commissioners. Report of Comptroller on sums paid for office rent, fuel and lights, stationery, clerk hire, and postage. 15p. (Ass. doc. 1846, no. 118)
- Report of expenditures for repairs and for bringing into use work previously done on enlargement. 16p. (Ass. doc. 1846, no. 150)
- Report of names, compensation, etc., of canal superintendents. 7p. (Ass. doc. 1846, no. 119)
- Report on pay of superintendents of repairs. 5p. (Ass. doc. 1846, no. 221)
- N. Y. (state)—Canal fund, Commissioners of. Report of names of persons paid by canal superintendent at Syracuse. 8p. (Sen. doc. 1846, no. 101)
- N. Y. (state)—Comptroller. Report of sums paid for expenses of canal commissioners. 15p. (Ass. doc. 1846, no. 118)
- Report on canal stocks deposited by banking associations and bankers as securities. 2p. (Ass. doc. 1846, no. 186)
- N. Y. (state)—Joint committee. Report on the accounts of the Treasurer and the canal and banking departments. 42p. (Ass. doc. 1846, no. 7) 386 N426
- N. Y. (state)—Ways and means, Committee on. Report on transfer of certain moneys to general fund. 2p. (Ass. doc. 1846, no. 189)
- Minority report, 7p. (Ass. doc. 1846, no. 190).
- N. Y. (state)—Canal commissioners. Report on amount of canal debt, Sept. 30, 1849. 5p. (Sen. doc. 1847, no. 151)
- N. Y. (state)—Canal fund, Commissioners of. Estimate of payments by, 1847. 3p. (Sen. doc. 1847, no. 43)
- Report on surplus applicable to prosecution of public works. 3p. (Sen. doc. 1847, no. 112)
- N. Y. (state)—Canals, Committee on. Report of majority relative to the appropriation of the surplus canal revenues and other canal funds for the prosecution of the unfinished public works. 39p. (Sen. doc. 1847, no. 52)
- Minority report on canal appropriations, 39p. (Sen. doc. 1847, no. 81).
- Report on canal appropriations. 5p. (Ass. doc. 1847, no. 128)
- Report on that part of the Comptroller's report relating to expenditures for canal repairs. 7p. (Ass. doc. 1847, no. 147)
- Report on the bill entitled, "An act making appropriations for the improvement of the canals and the prosecution of the public works," and the amendments made thereto by the Senate. 24p. (Ass. doc. 1847, no. 167)

N. Y. (state)—Comptroller. Report of expenditures for repairs on canals, 1844-46. 26p. (Ass. doc. 1847, no. 129)

——— Report on condition of canal funds, available and unavailable. 6p. (Sen. doc. 1847, no. 66)

——— Statement of balance of canal fund for year ending June 1, 1847. 7p. (Sen. doc. 1847, no. 132)

N. Y. (state)—Attorney-General. Opinion on constitutionality of law appropriating sum from which different awards for canal damages may be paid. 4p. (Ass. doc. 1848, no. 52)

N. Y. (state)—Canal board. Report on appropriations under section 3 of article 7 of the constitution, toward the Erie canal enlargement, and the Genesee Valley and Black River canals. 3p. (Ass. doc. 1848, no. 97)

——— Report on memorial of village of Syracuse for compensation for improvements on state lands. 7p. (Ass. doc. 1848, no. 171)

N. Y. (state)—Canal fund, Commissioners of. Report of estimates of necessary payments. 4p. (Ass. doc. 1848, no. 15)

N. Y. (state)—Canals, Joint committee on. Report on appropriations for canal enlargement. 5p. (Ass. doc. 1848, no. 146)

N. Y. (state)—Comptroller. Report on application of surplus revenues of canals to payment of demands against state. 10p. (Ass. doc. 1848, no. 137)

——— Statement of canal moneys deposited in Mechanics and farmers' banks and New York state bank. 2p. (Ass. doc. 1848, no. 182)

N. Y. (state)—Select committee. Report on bill to secure payment of wages to laborers on canals. 3p. (Ass. doc. 1848, no. 173)

N. Y. (state)—Canal appraisers. Report on condition of books and records in office. 13p. (Sen. doc. 1849, no. 28)

N. Y. (state)—Canal commissioners. Report on expense of bringing into use one set of enlarged locks from Syracuse to Buffalo. 14p. (Ass. doc. 1849, no. 116)

N. Y. (state)—Canal fund, Commissioners of. Report on proposition to prohibit them from keeping on deposit in any bank moneys exceeding one-third of bank's capital. 2p. (Ass. doc. 1849, no. 31)

——— Report relative to bank fund stock in the canal department. 2p. (Sen. doc. 1849, no. 35)

N. Y. (state)—Canals, Committee on. Report on canal appropriations. 5p. (Ass. doc. 1849, no. 178)

N. Y. (state)—Comptroller. Report on amounts of state stocks (including canal) held by citizens and aliens. 2p. (Sen. doc. 1849, no. 29)

——— Report relative to extinguishing Canal and General fund debts, etc. 3p. (Ass. doc. 1849, no. 33)

Ruggles, Samuel Bulkley. Vindication in 1849 of the canal policy of New York of 1838. 50p. O. N. Y. 1849. 386 R84

Relation of the political parties of the state to the canal policy, and their part in the control of the Erie canal.

Canal debt. (see Amer. R. R. jour. 1850, 23:23-24)

620.5 qJ2

Amount chargeable upon the sinking fund Sept. 30, 1849.

N. Y. (state)—Canal Department, Auditor of. Report of expenditures under certain laws of 1849. 8p. (Ass. doc. 1850, no. 81)

N. Y. (state)—Canal fund, Commissioners of. Report concerning said fund. 5p. (Sen. doc. 1850, no. 97)

N. Y. (state)—Canals, Committee on. Report on annual reports of canal commissioners and commissioners of canal fund. 5p. (Ass. doc. 1850, no. 153)

N. Y. (state)—Governor. Messages.

Ass. jour.	1850, 73:24
"	1851, 74:16-17
"	1853, 76:1058
"	1856, 79:99
"	1857, 80:11-13
"	1858, 81:124
"	1859, 82:12-13
"	1860, 83:11

Ass. jour.	1861, 84:12
"	1862, 85:11
"	1865, 88:13
"	1866, 89:22
"	1868, 91:17
"	1869, 92:16-17
"	1878, 101:15

Canal debt.

Ass. jour. 1850, 73:23	Ass. jour. 1868, 91:16-17
" 1851, 74:12, 1199-1201	" 1869, 92:15-18
" 1852, 75:15, 17	" 1870, 93:13, 15
" 1855, 78:11, 684-87 or Ass. doc. 97	" 1871, 94:19
" 1856, 79:98	" 1873, 96:17
" 1857, 80:11-12	" 1875, 98:28-30
" 1858, 81:123-24	Sen. doc. 1875, no. 64, or
" 1859, 82:10-11	Ass. doc. 102
" 1860, 83:12-13, 15, 465-70	Ass. jour. 1876, 99:23, 25
" 1861, 84:13, 15	" 1877, 100:14-15
" 1862, 85:11-12	" 1879, 102:18-19
" 1863, 86:90	" 1880, 103:14-15
" 1864, 87:14-15	" 1881, 104:16
" 1865, 88:13	" 1882, 105:70
" 1866, 89:21-22	" 1883, 106:13-14
" 1867, 90:32-33	" 1884, 107:14-15

Canal revenues, tolls and expenditures.

Ass. jour. 1850, 73:24	Ass. jour. 1862, 85:13
" 1851, 74:1198	" 1866, 89:23
" 1853, 76:885-90, or, Ass. doc. 91	" 1875, 98:24-25, 31
" 1853, 76:1060; Sen. doc. 67	" 1875, 99:600-3
" 1854, 77:25-30	" 1881, 104:16
" 1856, 79:99	" 1895, 118:25-26
" 1857, 80:14	" 1896, 119:25-26
" 1859, 82:13	" 1901, 124:1855-61

Enlargement and improvement.

Democratic state senators. (see United States mag. and democratic rev. 1851, 28:459-64)  
051 Un3

Address of those Senators who resigned their seats rather than countenance the violation of the constitution relative to the canal bill, etc.

N. Y. (state)—Attorney-General. Opinion on constitutionality of bill for enlargement of canals. 22p. (Sen. doc. 1851, no. 68)

Statement as to annual report of commissioners of canal fund. 2p. (Ass. doc. 1851, no. 30)

N. Y. (state)—Canals, Committee on. Report of the majority on the Assembly bill to complete the enlargement of the canals of the state. 24p. (Sen. doc. 1851, no. 69)

Favors issuing certificates redeemable out of the surplus revenues. Answers objections of the Attorney-General. Opinion of Daniel Webster appended.

N. Y. (state)—Comptroller. Report relative to unclaimed interest on stocks (including canal) issued by state. 1p. (Sen. doc. 1851, no. 83)

N. Y. (state)—Finance, Committee on. Report in relation to unclaimed interest on stocks (including canal) issued by state. 2p. (Sen. doc. 1851, no. 54)

Stanton, H. B. New York finances. (see United States mag. and democratic rev. 1851, 28:270-81)  
064 Un3

Speech on the Governor's message delivered in the Senate, Jan. 11, 1851.  
Tilden, Samuel Jones. The anticipation of canal revenues and the constitution, Apr. 7, 1851. (see his Writings and speeches. 1885. 1:248-77)  
308 T45

N. Y. (state)—Canal Department, Auditor of. Report of estimates on expenses for fiscal year. 3p. (Ass. doc. 1852, no. 116)

N. Y. (state)—Canal fund, Commissioners of. Report, loans to banks. 13p. (Sen. doc. 1852, no. 81)

N. Y. (state)—Comptroller. Reply to resolutions of the Senate, in relation to the general fund state debt, Mar. 8, 1852. 15p. (Sen. doc. 1852, no. 68)  
1040 P v. 1852

N. Y. (state)—Finance, Committee on. Report of minority on the bill relative to the general fund state debt, and special report of Comptroller. 22p. (Sen. doc. 1852, no. 77)  
040 P v. 1224

Bristol, Nathan. The canal question; a loan or a tax; speech . . . on the proposed amendment to the constitution . . . in Senate, Mar. 28. 14p. O. Alb. 1853.  
040 P v. 1233

Canal problem; shall the canals be maintained at the expense of the state, or shall they be made self-supporting? 7p. O. n.p. 1853.  
355

Against proposed amendments of art. 7, sect. 3 of the constitution.

**McMurray, William.** Democratic policy in regard to the canals and their completion; speeches on the Governor's message in Assembly, Jan. 30 and Feb. 1, 1843; and on the proposition to amend the constitution, in Senate, Mar. 26 and 28, 1853. 27p. O. 040 P v.477  
Reported for *Albany argus*.  
Also in volume of pamphlets (040 P v.1233)

**N. Y. (state)—Canal Department, Auditor of.** Communication on expenditures of appropriation for the support and maintenance of the canals for the current fiscal year. 2p. (Ass. doc. 1853, no. 126)

——— Report of expenditures from current appropriations. 2p. (Sen. doc. 1853, no. 84)

——— Report of reasons for not charging claims which accrued prior to June 1, 1846, to canal debt sinking fund. 11p. (Sen. doc. 1853, no. 51)

——— Statement of charges for travel and compensation of division and resident engineers. 45p. (Ass. doc. 1853, no. 73)

**N. Y. (state)—Canal fund, Commissioners of.** Report on application of surplus revenues to claims arising prior to June 1, 1846. 2p. (Ass. doc. 1853, no. 125)

**N. Y. (state)—Canals, Committee on.** Report in reference to so much of the Governor's message as relates to canals. 18p. (Ass. doc. 1853, no. 64) 040 P v.1233  
Favors taxation for completion of canals.

——— Report of the majority on the amendments to the constitution. 7p. (Ass. doc. 1853, no. 98)

Recommends distributing the amount authorized for canals in equal amounts; also that law of 1851 concerning contracts be repealed.

——— Report of the minority on the amendments to the constitution. 7p. (Ass. doc. 1853, no. 99)

Objects to report of majority, on the ground that by their plan it will take too long to complete the canals and it will become necessary to liquidate a part of the debt by taxation.

**N. Y. (state)—Canals, Select committee on.** Report of the majority on the resolution to amend the third section of article 7 of the constitution of the state. 14p. (Sen. doc. 1853, no. 42)

Opposes taxation. Proposes that the surplus revenues of canals be used on enlargement.

——— Report of the minority on the resolution to amend the third section of article 7 of the constitution of the state. 43p. (Sen. doc. 1853, no. 46)

**N. Y. (state)—Comptroller.** Report on availability of state tax for canal purposes. 3p. (Ass. doc. 1853, no. 61 and 114)

**N. Y. (state)—Conference, Committee of.** Report on amendments to the constitution in relation to the canals. 32p. (Ass. doc. 1853, no. 116)

**N. Y. (state)—Engineer and Surveyor.** Report relative to the cost of completing the canals. 4p. (Sen. doc. 1853, no. 64)

**N. Y. (state)—Finance, Committee on.** Report on expenses of canal department. 2p. (Sen. doc. 1853, no. 10)

——— Report on revenues of general and canal funds. 4p. (Sen. doc. 1853, no. 84½)

**N. Y. (state)—Ways and means, Committee on.** Report of majority on bill to provide means to pay present claims upon the treasury, to support the government, to carry on the public works, etc. 15p. (Ass. doc. 1853, no. 48)

Minority report, 15p. (Ass. doc. 1853, no. 54).

**New York, Chamber of commerce of.** Memorial on proposed amendment of constitution. 2p. (Ass. doc. 1853, no. 100)

Favors immediate action on amendment of constitution enabling the state to borrow money for the enlargement of the Erie canal. Opposes taxation of railroads.

**Williams, Josiah B.** The canals; sketch of the remarks of J. B. Williams upon the canal question in Senate, June 3, 1853. 8p. O. Alb. 1853. 040 P v.223  
States that improvements cannot be made upon canals without change in the state constitution.

**N. Y. (state)—Canal Department, Auditor of.** Report of funds advanced to persons claiming to be superintendents of canal repairs. 2p. (Sen. doc. 1854, no. 63)

**N. Y. (state)—Canals, Committee on.** Report on bill to provide for the enlargement and completion of the canals, and for refunding the sums received for canal revenue certificates. 4p. (Ass. doc. 1854, no. 119)

N. Y. (state)—Canvassers, Board of. Certificate as to the result of special election concerning the constitutional amendment relating to completion of the canals. 4p. (Sen. doc. 1854, no. 85; or, Ass. doc. 1854, no. 85)

N. Y. (state)—Canal Department, Auditor of. Communication in regard to question embraced in the bill, entitled "an act appropriating money to pay for work done on section 370 of the Erie canal enlargement." 8p. (Ass. doc. 1855, no. 72)

— Report on fees received in office. 2p. (Ass. doc. 1855, no. 116)

N. Y. (state)—Railroads, Committee on. Report on the message of the Governor in relation to deficiencies in the canal revenue. 20p. (Sen. doc. 1855, no. 74)

N. Y. (state)—Ways and means, Committee on. Report on canal appropriations. 7p. (Ass. doc. 1856, no. 90)

— Report on canal debt. 27p. (Ass. doc. 1856, no. 181)

Historical.

N. Y. (state)—Judiciary, Committee on. Report on release of J. D. Shepard from obligation as surety for funds of state in Walter Joy's bank. 10p. (Ass. doc. 1857, no. 179)

Minority report, 8p. (Ass. doc. 1857, no. 186)

N. Y. (state)—Canal Department, Auditor of. Report of outstanding canal drafts. 2p. (Sen. doc. 1858, no. 109)

— Report on cost of canals (excluding Erie and Champlain). 12p. (Sen. doc. 1858, no. 129)

N. Y. (state)—Canal fund, Commissioners of. Report on appropriations, condition of funds, etc. 22p. (Ass. doc. 1858, no. 49)

N. Y. (state)—Engineer and Surveyor. Report relative to the amount of money necessary to complete the unfinished canals. 5p. (Ass. doc. 1858, no. 116)

N. Y. (state)—Canal Department, Auditor of. Report on drafts drawn by canal commissioners. 3p. (Sen. doc. 1859, no. 67)

— Statement showing at what time accumulation of sinking fund will liquidate canal stock debt. 4p. (Sen. doc. 1859, no. 57)

N. Y. (state)—Canal fund, Commissioners of. Report on canal debt. 2p. (Sen. doc. 1859, no. 107 and Ass. doc. 1859, no. 179)

N. Y. (state)—Canals, Committee on. Report on the bill, entitled "an act to provide for the payment of work done and materials furnished on and for certain parts of the Erie canal enlargement." 2p. (Sen. doc. 1859, no. 75)

N. Y. (state)—Engineer and Surveyor, and Auditor of Canal Department. Report on estimates, cost, receipts and expenditures of Oswego canal. 2p. (Sen. doc. 1859, no. 61)

N. Y. (state)—Finance, Committee on. Report on canal debt. 6p. (Sen. doc. 1859, no. 115)

Minority report, 11p. (Sen. doc. 1859, no. 119).

N. Y. (state)—Governor. Message. (*see* Ass. jour. 1859, 82:1416-18)

Objections to payment of interest on canal commissioner's drafts: (1) furnishes no safeguards against abuse; (2) sanctions a new form of state indebtedness.

N. Y. (state)—Canals, Committee on. Report on the bill entitled "An act to provide for the payment for work done and materials furnished on and for certain parts of the Erie canal enlargement." 2p. (Sen. doc. 1860, no. 25)

N. Y. (state)—Claims, Committee on. Report on the bill to provide for the payment for materials furnished and work done, on certain portions of the Erie canal enlargement, with testimony relating to same. 8p. (Ass. doc. 1860, no. 175)

Sessions, W. L. Canals, state finances, taxing property passing over railroads; speech in Senate on bill making appropriations for the completion of the Genesee Valley and Black River canals and for the enlargement of the Cayuga and Seneca, Oswego and Erie canals, Apr. 6, 1860. 19p. O. Alb. 1860. 040 P v.1248

N. Y. (state)—Canal Department, Auditor of. Report on drafts remaining unpaid. 123p. (Sen. doc. 1861, no. 56)

N. Y. (state)—Governor. Messages.

Ass. jour. 1861, 84:13-14

1862, 85:12-13

Canal fund.

N. Y. (state)—Public accounts, Commissioners to examine. Report on accounts of the Treasurer, the canal department and the securities of the banking department. 59p. (Ass. doc. 1861, no. 23)

New York canals. (see Amer. R. R. jour. 1861, 34:602) 900 words. 620.5 qJ2  
From *Albany evening journal*.  
Condition of the canals and their revenues, Jan. 1. 1860, and the policy of the canal board.

N. Y. (state)—Canal Department, Auditor of. Communication asking money for repairs of canals. 2p. (Ass. doc. 1862, no. 98)

——— Report of drafts drawn and paid on contracts, 1859–62. (Ass. doc. 1862, no. 244)

——— Report on amount of money collected by tax and expended for enlargement of Champlain canal. 2p. (Ass. doc. 1862, no. 47)

——— Report on moneys of canal fund deposited in insolvent banks. 6p. (Ass. doc. 1862, no. 156)

N. Y. (state)—Canal fund, Commissioners of. Report on payment of interest on state debt in coin. 15p. (Sen. doc. 1862, no. 113)

N. Y. (state)—Comptroller. Report on state funds in banks. 3p. (Ass. doc. 1862, no. 155)

N. Y. (state)—Canal commissioner, eastern division. Report on expenditures for ordinary repairs. 9p. (Sen. doc. 1863, no. 52)

N. Y. (state)—Canal Department, Auditor of. Report of moneys on hand. 2p. (Ass. doc. 1863, no. 86)

——— Report of receipts and expenses for three years. 2p. (Ass. doc. 1863, no. 112)

——— Report on state balances in bank of Manhattan company. 7p. (Sen. doc. 1863, no. 92)

N. Y. (state)—Canals, Committee on. Minority report on the Senate bill to appropriate the remainder of the canal revenues. 4p. (Ass. doc. 1863, no. 60)

N. Y. (state)—Canal Department, Auditor of. Report of appropriations for extraordinary repairs and improvements. 8p. (Ass. doc. 1865, no. 107)

N. Y. (state)—Canal commissioner, Western division. Report on condition of canal banks at Rochester. 1p. (Sen. doc. 1866, no. 68)

N. Y. (state)—Canal Department, Auditor of. The canals. (see Annual financial report for 1866, p.26–41) 386 N4261  
Historical sketch.

Canal enlargement; proposed financial policy of New York state. Editorial. (see Commer. and finan. chron. 1867, 5:199–1) 2800 words. 332 qC78

N. Y. (state)—Canal Department, Auditor of. Report of moneys realized from taxes levied for extension of Chenango canal. 1p. (Sen. doc. 1867, no. 21)

N. Y. (state)—Canals, Committee on. Report on memorial of New York produce exchange relative to canal finances. 5p. (Ass. doc. 1869, no. 193)

Canal reform; the funding bill. Editorial. (see Commer. and finan. chron. 1870, 11:583–84) 1400 words. 332 qC78

N. Y. (state)—Canal Department, Auditor of. Report on payment of interest on canal debt, etc. 37p. (Sen. doc. 1870, no. 70)

N. Y. (state)—Canal fund, Commissioners of. Report on canal debt. 3p. (Ass. doc. 1870, no. 140)

N. Y. (state)—Canals, Committee on. Report on extension of time for payment of canal debt. 5p. (Ass. doc. 1870, no. 195)

N. Y. (state)—Governor. Message. (see Ass. jour. 1870, 93:13)  
Canal fund.

Opinions of G. F. Comstock and W. M. Evarts on constitutionality of a law embracing: 1. Funding of canal debt; 2. Appropriation of the canal revenues in part as a sinking fund to pay debt, proposed to be funded, and in part for improvement of canals; 3. Reduction of tolls. (see Commercial union of the state of New York. Proceedings of state convention. 1870. Appendix, p.98–100) 040 P v.2124

From *New York tribune*, Mar. 10, 1870.

N. Y. (state)—Canal Department, Auditor of. Statement of amount of money borrowed by state during 1870 for canal purposes. 4p. (Sen. doc. 1871, no. 36)

N. Y. (state)—Canal fund, Commissioners of. Statement as to moneys borrowed, 1868 and 1869. 3p. (Sen. doc. 1871, no. 47)

N. Y. (state)—Canal Department, Auditor of. Report on certain moneys appropriated during 1870-71. 3p. (Ass. doc. 1872, no. 134)

——— Statement of payments for ordinary repairs, Oct.-Dec. 1871. 2p. (Sen. doc. 1872, no. 45)

Canal funding bill. (see Buffalo board of trade. Statement of trade and commerce for 1873, p.106-7) 381 B86

N. Y. (state)—Canal Department, Auditor of. Report on cost of construction of each of state canals, amount of toll received, expenses of each year since 1846, amount paid for canal damages or canal claims, also amount of tolls credited to Erie canal that were derived from property coming from each of the other canals of the state, Mar. 20, 1873. 31p. (Ass. doc. 1873, no. 96) 386 N4261

New York, Chamber of commerce of. Resolutions advocating the funding of canal debt. 2p. (Sen. doc. 1873, no. 76)

Only way to save the canals is to fund canal debt and prevent taxation. 5p. O. Alb. 1873. 386

Contents: Extracts from Gov. Dix's message.  
"On the home stretch." *Buffalo commercial advertiser*.  
Extract from *New York times*.

N. Y. (city)—Mayor. Message to the common council in reference to the pending amendment to the state constitution relative to funding the canal and general fund debts. 16p. O. N. Y. 1874. 352.0747 N4

Opposes the proposed amendment; favors a partial reduction of the rate of tolls, and increasing the efficiency of the Erie canal by enlarging it.

N. Y. (state)—Attorney-General. Opinion on effect of proposed constitutional amendment relating to funding of canal debt. 2p. (Ass. doc. 1874, no. 34)

N. Y. (state)—Canal board. Proceedings relating to deposit of canal tolls in banks. 2p. (Sen. doc. 1874, no. 87)

N. Y. (state)—Secretary of state. Report relative to canvass of votes on amendments. 36p. (Ass. doc. 1874, no. 15)

New York, Chamber of commerce of. Report of committee in relation to proposed amendment to the state constitution for funding the canal debt. (see Annual report, 1874, 16:146-148) 381 N42

Followed by resolutions, p. 148-49.

——— Resolution on proposed amendment to constitution for funding canal debt. (see Annual report, 1874, 17:3-4) 381 N42

See also Sen. doc. 1874, no. 54; or, Ass. doc. 1874, no. 161.

Additional resolutions on same subject; see Sen. doc. 1874, no. 68; or, Ass. doc. 1874 no. 86.

New York cheap transportation association. Resolutions protesting against the proposed amendment relative to funding the canal and general fund debt. 2p. (Ass. doc. 1874, no. 92; or, Sen. doc. 1874, no. 71)

New York produce exchange. The New York canals. (see Annual report, 1873-74, p.246-63) 381 N423

Canal finances.

——— Protest against proposed amendment relative to funding the canal and general fund debt. 2p. (Ass. doc. 1874, no. 64)

Remonstrance of German property owners in New York city against proposed amendments to constitution, relative to funding canal debt. 4p. (Ass. doc. 1874, no. 118)

N. Y. (state)—Canal Department, Auditor of. Report on expenditures, Oct.-Dec. 1874. 15p. (Sen. doc. 1875, no. 63)

N. Y. (state)—Ways and means, Committee on. Report relative to state moneys in banks. 45p. (Ass. doc. 1875, no. 122)

N. Y. (state)—Governor. Memoranda filed with Assembly bill, no. 274, entitled, "an act to authorize a tax of three-tenths of a mill per dollar of valuation to provide for deficiency in the sinking fund under section 3 of article 7 of the constitution," 1876. (see Tilden, S: J. Writings and speeches. 1885. 2:317-23) 308 T45



N. Y. (state)—Ways and means, Committee on. State Treasurer's statement relative to payment of drafts or warrants drawn by any person assuming to act. 2p. (Sen. doc. 1876, no. 39)

N. Y. (state)—Canal Department, Auditor of. Statement of expenditures on Erie canal, April–Nov. 1876. 5p. (Ass. doc. 1877, no. 55)

——— Report on cost of maintenance, Oct. 1876 to Sept. 1877. 1p. (Ass. doc. 1878, no. 62)

N. Y. (state)—Comptroller. Answer in reply to resolution of Assembly, as to taxation for the canals. 2p. (Ass. doc. 1878, no. 65)

N. Y. (state)—Engineer and Surveyor. Report on expenses of work. 11p. (Ass. doc. 1878, no. 123)

N. Y. (state)—Governor. Message. (see Ass. jour. 1878, 101:17)

No further expenditure should be made on the Oswego, Champlain and Black River canals.

N. Y. (state)—Canal Department, Auditor of the. Report on amount of money paid from the repair appropriation since Oct. 1, 1879. 1p. (Ass. doc. 1880, no. 49)

N. Y. (state)—Governor. Veto of certain items in canal appropriations bill. 1p. (Sen. doc. 1881, no. 72)

N. Y. (state)—Legislature. Concurrent resolutions proposing amendments to article 7 of the constitution, and providing for the abolition of tolls on the canals and the maintenance thereof by taxation. (see N. Y. (state)—Public Works, Superintendent of. Annual report for 1881. p.203–4) 386 N425

N. Y. (state)—Canal Department, Auditor of. Report on amounts paid for salaries and expenses, etc. 4p. (Ass. doc. 1882, no. 86)

N. Y. (state)—Comptroller. Report on fund for enlargement of Champlain canal. 1p. (Sen. doc. 1882, no. 60)

N. Y. (state)—Engineer and Surveyor. Retrospect of 25 years, with statement showing the total revenues from tolls, interest on toll deposits and miscellaneous sources; the total expenditures for superintendence, collection and ordinary repairs; the profit or loss in operating each canal and total cost of construction, exclusive of interest paid on canal loans, to 1882. (see annual report for 1882, p.5–21) 626 L1

N. Y. (state)—Comptroller. Report on condition of canal fund. 2p. (Ass. doc. 1883, no. 147)

——— Statement of cost of maintenance of normal schools, lunatic asylums, canals, and armories for past ten years. 10p. (Sen. doc. 1883, no. 58)

N. Y. (state)—Treasurer. Statement of state funds in banks. 4p. (Sen. doc. 1890, no. 25)

Statement of canal appropriations, 1880–89. 10p. (Sen. doc. 1890, no. 32)

N. Y. (state)—Attorney-General. Communication relative to assessed value of property of the state for payment of canal and general fund deficiencies, directed to be paid by chapter 700, laws of 1872. 14p. (Sen. doc. 1891, no. 20)

N. Y. (state)—Public Works, Superintendent of. Communication relative to the total annual expense of the canals for years 1884–90. 5p. (Sen. doc. 1891, no. 52)

N. Y. (state)—Senate. Resolutions relative to the appropriation of moneys which are expended yearly in superintendence and maintenance of the canals of this state. 2p. (Sen. doc. 1891, no. 69) 386

New York, Chamber of commerce of. Resolution and remarks by Louis Windmuller in favor of the issue of bonds by the state for not to exceed \$9,000,000 for the improvement of the canals, 1895. (see Annual report, 1895, 38:25–26) 381 N42

Nine million dollars appropriation, insufficient for improvements on canals. (see Eng. news, 1897, 38:224) 620.5 FN4

N. Y. (state)—Engineer and Surveyor and Superintendent of Public Works. Communication relative to appropriation for improvement of canals. 2p.

(Ass. doc. 1898, no. 15; Sen. doc. 1898, no. 4)

Andrews, Avery D. Opinion on apportionment of cost, constitutionality of certain means of providing funds for the canals, (see N. Y. (state)—Canals, Committee on, 1899. Report, 1900, p.110–16) 386 N42

In Ass. doc. 1900, no. 79.

Estimate of amount necessary, in addition to the \$9,000,000, for completing improvement contracted for. (*see Eng. news*, 1899, 41:81-97) 620.5 fN4

Rafter, George W., D. J. Howell and F. M. Sylvester. Engineering reports with estimates of cost for enlargement of Erie canal. (*see N. Y. (state)—Canals, Committee on*, 1899. Report, 1900, p. 81-107) 386 N42  
In *Ass. doc.* 1900, no. 79.

Symons, Thomas W. Estimates of cost of different plans for canal improvements. (*see N. Y. (state)—Canals, Committee on*, 1899. Report 1900. p.68-70) 386 N42  
In *Ass. doc.* 1900, no. 79.

The canal fund and enlargements. (*see Hulbert, A. B. The great American canals*, 1904 v.2, p.178-204) 917.3 H871

¶ Scheme of Governor Odell for financing the work of canal improvement; editorial on annual message. (*see Bradstreet's* 1904, 32:17) 200 words. 330.5 fB72

### INVESTIGATIONS.

*See also* Articles on construction and history of more than one canal.

N. Y. (state)—Select committee. Report on petitions from inhabitants in vicinity of Champlain canal praying that an inquiry be instituted into the conduct of the acting commissioner and his agents, in constructing said canal. (*see Sen. jour.* 1822, 45:341-43)

An act to provide for the payment of certain notes given by Myron Holley, as treasurer of the canal commissioners. 1p. (*Ass. doc.* 1824, no. 10)

N. Y. (state)—Canal commissioners. Report as to private notes given for public work on the canal. (*Ass. doc.* 1824, no. 189; or *Ass. jour.* 1824, 47:935-36, 961-66, 936)

N. Y. (state)—Comptroller. Report relative to the sureties of the canal commissioners. (*see Ass. jour.* 1824, 47:985)

N. Y. (state)—Select committee. Report on investigation of Myron Holley's accounts as canal commissioner. (*Ass. doc.* 1824, no. 5; or, *Ass. jour.* 1824, 47:1184-89)

N. Y. (state)—Ways and means, Committee of. Report on the examination of the accounts and proceedings of the canal commissioners. (*Ass. doc.* 1824, no. 203; or, *Ass. jour.* 1824 47:1073-80, 81)

An act to provide for the payment of certain notes given by Myron Holley, as treasurer of the canal commissioners, passed Mar. 7, 1825. (*see Laws of New York*)

Also *Ass. doc.* 1825, no. 35.

An act to provide for the settlement of the accounts of Myron Holley, late canal commissioner, passed Apr. 21, 1825. (*see Laws of New York*)

Also *Ass. doc.* 1825, no. 182.

N. Y. (state)—Attorney-General. Report concerning the liability of the sureties of Myron Holley, late canal commissioner, 23p. (*Sen. doc.* 1825, no. 249)

N. Y. (state)—Canal commissioners. Report on the memorial of Rufus Randal for relief from alleged wrongful directions of the acting commissioner, eastern section Erie canal. 4p. (*Ass. doc.* 1825, no. 138; or, *Ass. jour.* 1825, 48:589-92)

N. Y. (state)—Canals, Joint committee on. Report on the memorial of Myron Holley, late canal commissioner. 2p. (*Ass. doc.* 1825, no. 181; or, *Ass. jour.* 1825, 48:735-36)

An act for the relief of Myron Holley, late canal commissioner. 1p. (*Ass. doc.* 1826, no. 160)

N. Y. (state)—Comptroller. Report relative to the settlement of the accounts of Myron Holley, late canal commissioner. (*see Sen. jour.* 1826, 49:186-88)

N. Y. (state)—Select committee. Report of investigation in relation to the powers of the commissioners for draining the Cayuga marshes. (*see Ass. jour.* 1826. 49:1146-49)

An act to direct the Comptroller to investigate disbursements, expenditures, etc. of W: L. Pierce, a superintendent on the canals, passed Apr. 17, 1827. (*see Laws of New York*)

Canal commissioners. (*see Alb. argus and gazette*, Apr. 9, 1827) 1200 words. 071 xAll  
Commendatory editorial.

N. Y. (state)—Claims, Committee on. Report on memorial and petitions for a reassignment of property conveyed by Myron Holley to the state, in satisfaction of the balance which stood against him as a canal commissioner. (*see Sen. jour.* 1827, 1st sess. 50:349-51)

Bill entitled "an act for settling the claims of Myron Holley, late canal commissioner." 1p. (*Ass. doc.* 1828, no. 47)

N. Y. (state)—Claims, Committee on. Report on claim of Myron Holley, late canal commissioner. (*see* Ass. jour. 1828, 51:355-58)

N. Y. (state)—Comptroller. Report on investigation made pursuant to act of Apr. 17, 1827, relative to expenditures of moneys on the canals. (*see* Ass. jour. 1828, 51:116-61)

Testimony taken on examination of the accounts of W. L. Pierce, 111p. F. Appendix B.

N. Y. (state)—Claims, Committee on. Report on the memorial of Myron Holley, late canal commissioner. 5p. (Ass. doc. 1828, no. 46)

N. Y. (state)—Two-third bills, Committee on. Report on claim of Myron Holley, late canal commissioner. (Ass. doc. 1828, no. 167; or, Ass. jour. 1828, 51:744-48)

N. Y. (state)—Comptroller. Report on petition for an investigation of the expenditures and accounts of the commissioners appointed to drain the Cayuga marshes. 12p. (Ass. doc. 1830, no. 178)

N. Y. (state)—Canals, Committee on. Report relative to memorial of Gerrit Smith, asking for the removal of Henry Seymour as canal commissioner; also testimony before the committee and report on this testimony.

8p. Ass. doc. 1831, no. 237

20p. Ass. doc. 1831, no. 354

8p. Ass. doc. 1831, no. 356

N. Y. (state)—Comptroller. Report of investigation into accounts of commissioners appointed to drain Cayuga marshes. 51p. (Ass. doc. 1831, no. 70)

N. Y. (state)—Finance, Committee on. Report on frauds committed by removal of salt at Salina without payment of duties, etc. 5p. (Sen. doc. 1831, no. 18)

N. Y. (state)—Select committee. Report on Comptroller's report relative to the investigation of the accounts of the commissioners for draining the Cayuga marshes. 1p. (Ass. doc. 1831, no. 330)

— Report on report of commissioners for draining the Cayuga marshes. 3p. (Sen. doc. 1831, no. 51)

Smith, Gerrit. Memorial specifying charges against Commissioner Seymour. 4p. (Ass. doc. 1831, no. 236)

N. Y. (state)—Banks and insurance companies, Committee on. Report on investigation of Delaware and Hudson canal company relative to issue of bank notes not payable on demand. 14p. (Sen. doc. 1839, no. 49)

N. Y. (state)—Comptroller. Communication relative to appointment of a committee to examine accounts of the commissioner of canal fund and of the Comptroller. 4p. (Ass. doc. 1839, no. 160)

N. Y. (state)—Joint Committee. Report on accounts of canal commissioners. (Ass. doc. 1839, no. 8) 386 N426

N. Y. (state)—Canals, Committee on. Report on so much of the petition of Hiram Wright and 109 millers, forwarders, merchants and business men, complaining of the official conduct of canal commissioners Bouck and Baker, and engineers Hutchinson and Mills as relates to the conduct of commissioner Bouck. 15p. O. (Ass. doc. 1840, no. 102)

N. Y. (state)—Joint committee. Report on accounts of the canal commissioners, commissioners of the canal fund, and treasurer. 10p. (Ass. doc. 1840, no. 14)

— Report concerning the accounts of the treasurer, canal commissioners, commissioners of the canal fund, and the banking department of the Comptroller's office. 29p. (Ass. doc. 1841, no. 151)

— Report on the accounts of the treasurer and the canal departments. 20p. (Ass. doc. 1842, no. 4) 386 N426

N. Y. (state)—Comptroller. Report on alleged connection of David Hamilton with canal contracts while acting as superintendent of repairs. 2p. (Sen. doc. 1843, no. 39)

N. Y. (state)—Select committee. Report on abuses by canal commissioners in letting of contracts, with testimony. 70p. (Sen. doc. 1843, no. 118)

— Report on management and expenditures of northern section, Champlain canal, with testimony. 231p. (Sen. doc. 1846, no. 144)

Bissell, Daniel P. Memorial relative to report of Assembly committee of 1846 on alleged canal frauds. 11p. (Sen. doc. 1847, no. 109)

Buell, William. Memorial relative to committee report on alleged canal frauds. 19p. (Sen. doc. 1847, no. 94)

- Fay, John D. Memorial of one of the engineers on the western division of the Erie canal relative to committee report on alleged canal frauds. 15p. Sen. doc. 1847, no. 93  
19p. Sen. doc. 1847, no. 94
- Hutchinson, Holmes. Memorial as to alleged misstatements and errors relative to probable cost of Erie canal improvement and Chemung canal. 11p. (Ass. doc. 1847, no. 218)
- N. Y. (state)—Canals, Committee on. Report on report of select committee of 1846 relative to canal frauds. 3p. (Ass. doc. 1847, no. 78)
- N. Y. (state)—Canals, Select committee on. Report upon the investigation in the expenditures of the public moneys upon the canals of the state of New York. 376+854p. O. (Ass. doc. 1847, no. 100) 386 N4265  
Includes testimony taken.
- N. Y. (state)—Public printing, committee on. Reports on report of select committee relative to canal frauds. 3p. Ass. doc. 1847, no. 84.  
3p. Ass. doc. 1847, no. 85.
- Ingraham, Jonas. Petition charging official malfeasance against Jacob Hinds, canal commissioner. 4p. (Ass. doc. 1850, no. 84)
- N. Y. (state)—Canal commissioner. Communication of Jacob Hinds as to charges of official malfeasance as canal commissioner, requesting investigation. 2p. (Ass. doc. 1850, no. 102)
- N. Y. (state)—Select committee. Report of the majority on investigation of alleged frauds on the Chemung canal, with testimony. 52p. (Sen. doc. 1850, no. 105)
- N. Y. (state)—Joint committee. Report of the examination of the accounts of the treasurer, banking and canal departments. 31p. (Ass. doc. 1851, no. 23) 336.747
- N. Y. (state)—Select committee. Report relative to canal frauds. 4p. (Ass. doc. 1851, no. 156)
- Testimony and exhibits before the committee, 328 p. (Ass. doc. 1851, no. 158.)
- Hatch, Israel T. The canal contracts; speech New York Assembly, Jan. 19, 1852, on inquiry into the canal contract frauds. 8p. O. n.p. n.d. 040 P v.477
- The late canal lettings, speech in Assembly, Mar. 26, 1852, on the report of the joint investigating committee, on the recent canal lettings. 12p. O. n. p. n. d. 040 P v.145
- N. Y. (state)—Canal board. Communication. 2p. (Sen. doc. 1852, no. 8)
- Resolution to inquire into action of members of late canal board.
- N. Y. (state)—Canal lettings, Joint committee on. Reports of the majority and minority, with testimony and schedules. 75+955+168p. O. Alb. 1852. (Ass. doc. 1852, no. 89) 386 N428
- Examination of all officers having charge of the completion and enlargement of canals. Gives estimates of engineers and contracts as awarded.
- N. Y. (state)—Select committee. Report (testimony) on investigation into paying of premiums or gratuities by banks for obtaining deposits of state funds. 12p. (Sen. doc. 1852, no. 98)
- N. Y. (state)—Canal Department, Auditor of. Report in relation to complaints or charges against certain canal superintendents. 273p. O. (Sen. doc. 1853, no. 71) 040 P v.1233  
Expenditures of superintendents, exhibits and testimony in case of S. A. Waterman.
- N. Y. (state)—Canal commissioner. Communication of Henry Fitzhugh, in reply to the preamble and resolutions, proposing a legislative investigation, with a view to impeachment. 3p. (Ass. doc. 1853, no. 27)
- Communication from J. C. Mather, reply to report of select committee to examine into the official conduct of certain state officials. 2p. Ass. doc. 1853, no. 104.  
32p. Ass. doc. 1853, no. 111.
- N. Y. (state)—Joint committee. Annual report of the committee to examine the Treasurer's accounts, and the canal and banking departments. 99p. (Ass. doc. 1853, no. 8)
- N. Y. (state)—Select committee. Report of investigation of the accounts of George Cole, resident engineer, eastern division. 2p. (Ass. doc. 1853, no. 132)
- Report relative to interest in mills and transportation line held by Henry Fitzhugh while a canal commissioner. 39p. (Ass. doc. 1853, no. 90)
- Report relative to the official conduct of certain state officers. 30p. (Ass. doc. 1853, no. 103)
- N. Y. (state)—Canal Department, Auditor of. Report of sums paid to attorneys in case of mandamus *ex rel.* Phelps *vs.* Newell. 4p. (Sen. doc. 1854, no. 45)

**N. Y. (state)—Attorney-General.** Report relative to the legal action against G. W. Newel, former Auditor, Canal Department. 2p. (Ass. doc. 1855, no. 122)

— Report on alleged liabilities against J. C. Mather, late canal commissioner. 2p. (Ass. doc. 1856, no. 186)

**N. Y. (state)—Joint committee.** Report of examination of accounts of treasurer, and banking and canal departments. 79p. (Ass. doc. 1856, no. 173) 336.747

**N. Y. (state)—Commerce, Committee on.** Report in relation to the official conduct of the harbor-masters of New York city. 34p. (Sen. doc. 1857, no. 100)

**N. Y. (state)—Select committee.** Report on charges against the harbor-masters of New York. 46p. Sen. doc. 1861, no. 38; 22p and 16p. Sen. doc. 1862, no. 38 and 82.

**Wright, William W.** Memorial of W. W. Wright, late canal commissioner, in reply to charges in report of Auditor of Canal Department. 7p. (Sen. doc. 1865, no. 50)

**N. Y. (state)—Select committee.** Report concerning investigation of alleged unjust discrimination in canal tolls, with testimony. 13 + 150p. (Ass. doc. 1867, no. 160)

**N. Y. (state)—Canal department, auditor of.** Denial of charges against N. S. Benton, made by canal investigating committee. 2p. (Sen. doc. 1868, no. 33)

— Memorial of N. S. Benton relative to charges made in report of canal investigating committee. 3p. (Sen. doc. 1868, no. 15)

**N. Y. (state)—Select committee.** Report on investigation of management of the canals and conduct of contracting board, Jan. 22, with testimony. 1018p. (Ass. doc. 1868, no. 32; or, Sen. doc. 1868, no. 13)

**N. Y. (state)—Canal board.** Resolution in favor of investigation of canal management and finances. 2p. (Ass. doc. 1872, no. 92)

**N. Y. (state)—Canals, Committee on.** Report on charges involving official conduct of W. W. Wright, canal commissioner, and John Haggerty, superintendent of Cayuga and Seneca canal, with testimony. 74p. (Ass. doc. 1872, no. 159)

**N. Y. (state)—Commerce, Committee on.** Report relative to the harbor-masters of New York. (Ass. doc. 1872, no. 164)

**N. Y. (state)—Investigating commission.** A transcript of the testimony showing the dealings of Francis S. Thayer, while Auditor, in claims against the state. 121p. O. n.p. 1875. 386

**N. Y. (state)—Joint committee.** Report in relation to canal investigation, with testimony. 677p. (Sen. doc. 1875, no. 88; or, Ass. doc. 1875, no. 152)

**New York, Chamber of commerce of.** Resolutions relative to investigations, Apr. 1, 1875. (see Annual report, 1875, 17:99-100) 381 N42

**New York produce exchange.** Resolutions, Apr. 1, 1875, for approving the action of Governor Tilden relative to the canal investigation. (see Annual report, 1874-75, p.55-56) 381 N423

**N. Y. (state)—Canal board.** Report on bill conferring additional powers for investigation of canals. 3p. (Ass. doc. 1876, no. 62)

**N. Y. (state)—Canal investigation, Joint committee relative to.** Report, Mar. 3, 1876. 36p. O. 040 P v.2124

Appendix contains statement about Otisco lake reservoir, submitted to the canal board.

**N. Y. (state)—Canal investigating commission.** Report. 2v. 2639p. map, O. (Sen. doc. 1876, no. 48) 386 N4267

Testimony taken in investigating mismanagement of canals.

**N. Y. (state)—Governor. Message.** (Ass. jour. 1876, 99:600-3; or, Sen. doc. 1876, no. 60)  
Recommends a "law conferring on canal board full power of investigation and redress of all wrongs in respect to canal work."

— Message relative to canal investigation. 4p. (Sen. doc. 1876, no. 24)

**Tilden, Samuel Jones.** Abuses and maladministration with canal revenues. (see his Writings and speeches. 1885, 2:213-22) 308 T45

**N. Y. (state)—Commission.** Report of commission appointed to investigate conditions on lateral canals, with testimony, etc. 207p. (Ass. doc. 1877, no. 30)

**N. Y. (state)—Attorney-General.** Report on trials for alleged canal frauds, 1875-79. 4p. (Sen. doc. 1880, no. 62)

**N. Y. (state)—Comptroller.** Communication on cost of canal investigations, 1875-80. 1p. (Sen. doc. 1880, no. 61)

- N. Y. (state)—Canals, Committee on. Report on investigation of terminal charges on grain at various ports in state, with testimony. 205p. (Ass. doc. 1881, no. 114)
- N. Y. (state)—Comptroller. Statement of amounts paid for canal investigation, 1875-80. 1p. (Sen. doc. 1881, no. 18)
- N. Y. (state)—Canal matters, Special committee to investigate. Report relative to reducing the cost in the management of the canals. 7p. (Sen. doc. 1882, no. 24)  
For testimony accompanying report see *Law pamphlets*, 203p. v.92 (N. Y. state law lib.)
- N. Y. (state)—Canals, Investigating Committee on. Report of the committee appointed by the Assembly, April 28, 1891, to investigate the management of the canals during the past 11 years. 16p. (Ass. doc. 1892, no. 57)
- Fox, Austen G. and Wallace Macfarlane. Report of counsel appointed Jan. 1899 by the Governor to prosecute certain state officials for alleged criminal practices in carrying out the canal improvement under chapters 79, laws of 1895, and 794, laws of 1896. 39p. O. n.p. n.d. 386
- Canal commissioners' report. (see *See*, Aug. 11, 1898) 6000 words.  
Summary of the report of the commission appointed to investigate matters relating to the New York state canals, with editorial comment.
- Defenders of public maladministration; Theodore Roosevelt and T. L. Woodruff on canal scandals. 8p. O. n.p. 1898. 386
- Investigation of the New York state canals. (see *Eng. news*, Aug. 11, 1898, 40:88-89) 4700 words. 620.5 fN4
- An abstract of the report of commissioners appointed by the governor to investigate the work done under the \$9,000,000 appropriation, with editorial comment.
- Extracts from report of canal investigation commission of 1898, with comment. 64p. O. 386
- N. Y. (state)—Engineer and Surveyor. Reply to report of canal investigating commission, Sept. 12, 1898. (see *Annual report for 1898*, p.276-364) 626 L1
- N. Y. (state)—Senate. Resolution relative to the appointment of a committee to inquire into the canal improvement. 3p. (Sen. doc. 1898, no. 8)
- New York state canal investigation. (see *R. R. gas.* July 29, 1898, 30:542-44) 4800 words. 385 fR132
- Full and interesting account of the project to improve the canals, the estimates given, the results of the careful investigation of the commission appointed by the Governor.
- New York state canals. (see *R. R. gas.* Jan. 7, 1898, 30:10-11) 1600 words. 385 fR132
- Editorial comment on recent developments concerning the estimates of cost of proposed improvements.
- Recent engineering on the New York state canals. (see *Eng. rec.* 1898, 38:244, 447-49) 1000 and 4000 words. 620.5 fN7
- Extract from report by L. P. North and C. E. Cooley concerning the management of the canal engineering work; also review of the State Engineer's reply to criticisms on the preliminary work of enlarging the canals, the choice of specifications and the classification of rocks and earth.
- Replies of State Engineer and Superintendent of Public Works, to the canal investigating commission. (see *Eng. news*, 1898, 40:280-81, 285-87) 5500 words. 620.5 fN4
- Abstracts of replies with editorial comment.
- Report of the New York state canal investigating commission. (see *Eng. rec.* 1898, 38:222, 226-28) 900 and 3000 words. 620.5 fN7
- Editorial and official summary of the report.
- The canals of the state of New York. (see *R. R. gas.* Mar. 17, 1899, 31:192-93) 800 words. 385 fR132
- Editorial comment on the appointment, by the Governor, of a special commission to investigate the policy of the state toward its canals.
- Countryman, E. Report of special counsel designated to examine the report and testimony transmitted to the Governor by the canal investigating commission. O. 1899.
- N. Y. (state)—Canal investigating commission. Report of the commission appointed by the Governor pursuant to chapter 15, laws of 1898, as amended by chapter 327, laws of 1898, to investigate matters in connection with the enlargement of the Erie, Champlain and Oswego canals. 217 p. (Ass. doc. 1899, no. 78) 626
- Also with *Trials* (N. Y. state law lib.).  
Includes reports of consulting and advisory engineers.
- N. Y. (state)—Governor. Message. (Ass. jour. 1899, 122:17)  
Report of investigating committee.

- N. Y. (state)—Governor. Message. (*Ass. jour.* 1890, 122:2551-52)  
 "Importance of making provision to enable counsel to find out whether or not indictments should be found against any persons connected with the canals."  
 ——— Message transmitting report of canal committee appointed to investigate proper policy in canal matters. 9p. (*Sen. doc.* 1900, no. 14; or, *Ass. doc.* 1900, no. 31)  
 New York canals. (*see Eng. rec.* 1900, 41:102-4) 6200 words. 620.5 FN7  
 Full abstract of a report of an investigation conducted by a special commission appointed by the Governor of New York. Also editorial on the importance of the investigation.  
 Symons, Thomas W. Concerning the surveys and estimates made by the New York state committee on canals. (*see Eng. news*, 1900, 43:162-63) 700 words. 620.5 FN4  
 Letter in reply to editorials, Mar. 1, 1900.

### TERMINAL CHARGES.

- See also* Articles on construction and history of more than one canal and Erie canal.  
 N. Y. (state)—Commerce and navigation, Committee on. Report on wharfage rates at the port of New York. 6p. (*Sen. doc.* 1859, no. 76)  
 Minority report, 8p. (*Sen. doc.* 1859, no. 78).  
 N. Y. (state)—Canals, Senate sub-committee on. Report concerning terminal charges, with testimony. 73p. (*Sen. doc.* 1875, no. 89)  
 Elevating charges at Buffalo and New York. (*see New York produce exchange. Annual report*, 1879, p.63-68) 381 N423  
 Letter and resolutions from S. E. Anthony of the Buffalo Board of canal forwarders, with the reply from Franklin Edson of New York produce exchange.  
 N. Y. (state)—Canals, Committee on. Report on investigation of terminal charges on grain at various ports in state, with testimony. 205p. (*Ass. doc.* 1881, no. 114)  
 New York, Chamber of commerce of. Report on the bill before the Legislature regulating elevator charges. 14p. O. N. Y. 1885. 381  
 De Puy, M. Address on state elevator bill, Mar. 28, 1889. 2p. O. (Executive and vigilant committee. Series of 1889. Doc. 6) 386  
 New York produce exchange. Reply of secretary relative to receipts and exports of grain at and from New York, storage and terminal charges, etc. 12p. (*Sen. doc.* 1896, no. 45)  
 Millions for the political canals. (*see Amer. rev. of revs.* 1898, 17:141) 420 words. 052 R321  
 Needed improvements are better dock facilities and reductions of charges about New York harbor.

### CANAL TOLLS; FREE CANALS.

- See also* Annual reports, Articles on construction and history of more than one canal and Commerce and navigation, etc.  
 Canal toll. Editorial. (*see Alb. daily advertiser*, May 9, 1825) 1600 words. N. Y. state lib.  
 ——— (*see Alb. daily advertiser*, May 23, 1825) 1600 words. N. Y. state lib.  
 Communication answering editorial of May 9.  
 N. Y. (state)—Canal board. Report on the petition of Wilkeson and Barton, and others, asking for a law authorizing a credit to be given for tolls. (*see Sen. jour.* 1828, 1st sess. 51:113-14)  
 ——— Report on petition of citizens of Washington county claiming that canal tolls, received at Albany and West Troy upon ascending merchandise, etc., destined to pass the Champlain canal, have been erroneously credited to the Erie canal. (*see Ass. jour.* 1829, 52:871-72)  
 N. Y. (state)—Attorney-General. Report relative to the constitutionality of imposing and collecting higher rates of tolls on the "navigable communications between the great western and northern lakes and the Atlantic ocean," and also higher duties on the manufacture of salt and on goods sold at auction than those which existed at the time of the adoption of the amended constitution. 4p. (*Sen. doc.* 1830, no. 344)  
 N. Y. (state)—Canal board. Report relative to the advantage of imposing higher duties or tolls on the canals. 14p. (*Sen. doc.* 1830, no. 291)  
 N. Y. (state)—Legislature. Concurrent resolutions for the suspension of the collection of certain tolls, Apr. 14 and 16, 1830. (*see Laws of New York*)

N. Y. (state)—Canal board. Report of amount received for tolls on packet boats and passengers for the last two years. 4p. (Sen. doc. 1832, no. 49)

Canal tolls and canal navigation. (see Niles' register, 1833, 45:59:60) 700 words.

305 qN59

From the *Albany argus*, Sept. 9. Prosperity. Increase of over \$150,000 over last year.

N. Y. (state)—Canal board. Report on three petitions from farmers and other citizens residing in western New York for modification of tolls on Erie canal. 6p. (Ass. doc. 1833, no. 320.)

Seneca and Cayuga canal. (see Amer. R. R. jour. 1833, 2:37)

620.5 qJ2

Statement of tolls received at Geneva, Apr. 4 to Dec. 15, 1832, with editorial comment.

N. Y. (state)—Canal commissioners. Report on petition of J. Buckdorff for refund of canal tolls paid on lumber. 2p. (Ass. doc. 1834, no. 274)

N. Y. (state)—Special committee. Report relative to petition for reduction of duties on salt. 2p. (Ass. doc. 1834, no. 23)

N. Y. (state)—Comptroller. Report relative to amount of tolls paid on Chemung canal. 2p. (Ass. doc. 1835, no. 159)

N. Y. (state)—Select committee. Report relative to tolls on the canal around the falls at Baldwinsville.

3p. Ass. doc. 1835, no. 232

1p. Ass. doc. 1836, no. 141

N. Y. (state)—Canal board. Report in relation to toll on gypsum from beds in this state. 2p. (Ass. doc. 1836, no. 294)

N. Y. (state)—Comptroller. Report in relation to sales of lands near Oswego canal and diversions of tolls from the Erie canal by said canal. 24p. (Sen. doc. 1836, no. 73)

— Report relative to toll revenues from lateral canals. 7p. (Sen. doc. 1836, no. 58)

N. Y. (state)—Select committee. Report on petition of inhabitants of Baldwinsville for law to regulate canal tolls at that place. 1p. (Ass. doc. 1836, no. 141)

Canal tolls. (see Alb. daily argus, Apr. 22, 1837) 1300 words.

071 xAl1

— (see Alb. daily argus, June 3, 1837) 900 words.

071 xAl1

Review of volume of business. Editorial.

— (see Alb. daily argus, July 10, 1837) 800 words.

071 xAl1

Payment of canal tolls. (see Alb. daily argus, Apr. 29, 1837) 1500 words.

071 xAl1

Debate in the Assembly, Apr. 27.

Tolls, tonnage and trade of the canals. Editorial. (see Alb. daily argus, Mar. 10, 1838) 1300 words.

071 xAl1

The lateral canals—tolls. (see Alb. daily argus, Mar. 7, 1839) 300 words.

071 xAl1

N. Y. (state)—Canal board. Report on petition for reduction of tolls on Chenango canal. 3p. (Ass. doc. 1839, no. 343)

N. Y. (state)—Canal commissioners. Report relative to revenues derived from canal tolls on Erie canal. 3p. (Ass. doc. 1839, no. 355)

N. Y. (state)—Canal fund, Commissioners of. Report respecting the tolls collected and the property transported during the year 1839, with other statistical information. 176p. (Sen. doc. 1840, no. 63)

N. Y. (state)—Ways and means, Committee on. Report relative to tolls on coal and lead. 2p. (Ass. doc. 1840, no. 343)

N. Y. (state)—Canal board. Report on the propriety of establishing a uniform rate of tolls on all the canals of this state. 2p. (Ass. doc. 1841, no. 222)

N. Y. (state)—Governor. Message. (see Ass. jour. 1841, 64:21)

Suggests negotiation with Ohio for reduction of tolls on our salt, to be reciprocated by reduction of our tolls upon coal and other minerals.

N. Y. (state)—Canals, Committee on. Report on the petition relative to the reduction of tolls on lead and copper. 1p. (Ass. doc. 1842, no. 158)

N. Y. (state)—Canal board. Statement of freights shipped and left at Buffalo, Black Rock and Oswego, together with receipts from tolls, 1830–42. 21p. (Ass. doc. 1843, no. 148)

N. Y. (state)—Comptroller. Statement of amount of tolls received from passengers on Erie canal, 1835–42. 4p. (Sen. doc. 1843, no. 21)



N. Y. (state)—Manufacture of salt, Committee on. Report on rebate of canal tolls on salt at certain points. 5p. (Ass. doc. 1843, no. 111)

Petition of manufacturers relative to rebate of canal tolls on salt at certain points. 7p. (Ass. doc. 1843, no. 133)

N. Y. (state)—Canal fund, Commissioners of. Report of tolls collected, 1840-43. 5p. (Sen. doc. 1844, no. 35)

Discriminating tolls. (see Amer. R. R. jour. 1845, 18:284-85) 620.5 qJ2

—— (see Niles' register, 1845, 68:99) 450 words. 305 qN59

Resolutions of the Assembly of Ohio and the decision of Chancellor Kent against discrimination of tolls in favor of New York and against other states.

N. Y. (state)—Canals, Committee on. Report concerning discrimination in canal tolls. 1p. (Sen. doc. 1845, no. 113)

—— Report relative to discrimination in tolls on the Erie and Oswego canals. 9p. (Ass. doc. 1845, no. 189)

Minority report, 66p. (Ass. doc. 1845, no. 190).

N. Y. (state)—Comptroller. Report of receipts from tolls on lateral canals, etc. 4p. (Sen. doc. 1845, no. 116)

New York, Chamber of commerce of. Memorial against increase of tolls on Erie canal. 2p. (Sen. doc. 1845, no. 61)

Ohio—Legislature. Preamble and resolutions relative to discriminating tolls upon the New York canals. (see Amer. R. R. jour. 1845, 18:237-38) 250 words. 620.5 qJ2

Petition of inhabitants of western New York, praying that tolls between Oswego and Albany be made the same as between Buffalo and Albany. 7p. (see Ass. doc. 1845, no. 81)

Remonstrance against discrimination in tolls on Oswego canal. 12p. (Ass. doc. 1845, no. 85)

N. Y. (state)—Canal fund, Commissioners of. Report of tolls collected Oct.—Dec., 1845. 3p. (Ass. doc. 1846, no. 33)

—— Report on reduction in tolls. 11p. (Sen. doc. 1846, no. 89)

N. Y. (state)—Comptroller. Report of tolls received from lateral canals, etc. 39p. (Ass. doc. 1846, no. 113)

Rates of toll on the New York and Ohio canals compared. (see Amer. R. R. jour. 1846, 19:235) 400 words. 620.5 qJ2

N. Y. (state)—Canal fund, Commissioners of. Rates of toll. (see Annual report, 1847, p.15-19; 1855, p.15-16; 1856, p.22-26; 1857, p.23-31; 1858, p.11-12; 1859, p.11-18) 386 N426

—— Report on tolls in 1846. 7p. (Ass. doc. 1847, no. 42)

N. Y. (state)—Comptroller. Report of canal tolls and amounts paid to superintendents of repairs. 5p. (Sen. doc. 1847, no. 40)

Albany pier proprietors. Report of income from tolls and wharfage. 4p. (Ass. doc. 1848, no. 142) 040 P1 v.50

N. Y. (state)—Canal department, Auditor of. Report on system of toll collectors' check accounts. 2p. (Ass. doc. 1849, no. 195)

Buffalo, citizens of. Memorial to the canal board in relation to the reduction of canal tolls in the state of New York. 30p. O. Buffalo, 1850. 040 P v.145

N. Y. (state)—Agriculture, Committee on. Report relative to canal tolls on salt. 15p. (Ass. doc. 1850, no. 165)

N. Y. (state)—Manufacture of salt, Committee on. Report on petition for reduction of canal tolls on foreign salt. 56p. (Ass. doc. 1850, no. 184)

Rates of toll on the New York state canals. (see Amer. R. R. jour. 1851, 24:83-84, 114-15) 5000 words. 620.5 qJ2

From the *Merchant's magazine*. General review to 1850.

Reduction of tolls and enlargement of the Erie canal. (see Amer. R. R. jour. 1851, 24:16) 600 words. 620.5 qJ2

From the *Buffalo express*. Need of immediate action to meet diversion of trade.

Tolls and tonnage of the New York state canals. (see Amer. R. R. jour. 1851, 24:227-28)

620.5 qJ2

From the *Merchant's magazine*. From 1820-50.

- Western transportation. (*see* Amer. R. R. jour. 1852, 25:267) 250 words. 620.5 qJ2  
Reduction of tolls and result.
- N. Y. (state)—Canal commissioners. Report on tolls and tonnage, Champlain canal, 1852. 2p. (Sen. doc. 1853, no. 20)
- N. Y. (state)—Canal Department, Auditor of. Report of tolls on property going to and coming from Canada, 1851 and 1852. 7p. (Sen. doc. 1853, no. 29)
- N. Y. (state)—Canal board. Resolutions on reduction of tolls. 2p. (Ass. doc. 1854, no. 134)
- N. Y. (state)—Canal Department, Auditor of. Report of tolls and tonnage on Oneida Lake canal and river improvement. 4p. (Ass. doc. 1854, no. 74)
- Trade and tonnage of the canals. (*see* Amer. R. R. jour. 1855, 28:102-3) 620.5 qJ2  
Report of the Auditor with comment.  
Favors reimposition of duties on railroad freight till the canal enlargement is completed.
- N. Y. (state)—Canal board. Report on discrimination in tolls. 54p. (Sen. doc. 1857, no. 127)
- Resolution on reduction of tolls. 2p. (Ass. doc. 1857, no. 187)
- Resolutions relative to canal tolls. 2p. (Sen. doc. 1858, no. 113)
- Resolutions relative to reduction of tolls on wheat and flour. 2p. (Sen. doc. 1858, no. 134)
- Resolutions relative to reduction of tolls on iron castings. 2p. (Sen. doc. 1858, no. 135)
- N. Y. (state)—Canal Department, Auditor of. Report on reduction of tolls on certain articles. 7p. (Sen. doc. 1858, no. 123)
- N. Y. (state)—Canal board. Proceedings relative to reduction of tolls. 3p. (Sen. doc. 1859, no. 87)
- Resolution relative to reduction of tolls. 1p. (Sen. doc. 1859, no. 111)
- N. Y. (state)—Canal Department, Auditor of. Report on property transported, tolls received, etc. 5p. (Ass. doc. 1860, no. 142)
- Report on tolls, trade, and tonnage of Champlain canal, 1850-59. 3p. (Ass. doc. 1860, no. 45)
- N. Y. (state)—Canals, Committee on. Report on petitions relating to canal tolls on certain articles. 4p. (Ass. doc. 1860, no. 182)
- Argument in relation to tolls on coal passing over the Erie canal. 23p. O. N. Y. 1862. 040 P v.1947
- N. Y. (state)—Canals, Committee on. Report on reduction of canal tolls on salted beef and pork. 4p. (Sen. doc. 1862, no. 102)
- Report on resolutions of the canal board concerning canal tolls. 4p. (Sen. doc. 1862, no. 60)
- Report relative to tolls, Oneida Lake canal. 3p. (Sen. doc. 1862, no. 83)
- N. Y. (state)—Canal board. Report on bill to establish uniform rates. 2p. (Ass. doc. 1863, no. 131)
- Resolutions on reduction of tolls on hides, grass- and clover-seed, car wheels, and car axles. 2p. (Sen. doc. 1863, no. 73)
- N. Y. (state)—Canals, Committee on. Report on reduction of canal tolls on hides, grass-seed, and car wheels; proposed by canal board. 2p. (Sen. doc. 1863, no. 94)
- Benton, W. S. New York canal tolls; letters in reply to Joseph Aspinall of Detroit board of trade, 1865. 14p. O. n.p., n.d. 040 P v.1947
- Canal tolls and western transportation. Editorial. (*see* Commer. and finan. chron. 1865, 1:322-24) 1700 words. 332 qC73
- N. Y. (state)—Canal board. Report on alleged difference between tolls on east and west bound coal. 2p. (Sen. doc. 1865, no. 16)
- Resolution on reduction of rates of canal toll on iron ore. 1p. (Sen. doc. 1866, no. 80)
- N. Y. (state)—Select committee. Report on investigation of alleged unjust discrimination in tolls on coal on Junction canal, with testimony. 13+150p. (Ass. doc. 1867, no. 160)
- Erie canal and the railroads. (*see* Commer. and finan. chron. 1869, 9:230) 700 words. 332 qC73
- Editorial favoring low tolls.

N. Y. (state)—Canal board. Report on deposit of tolls in banks. 4p. (Sen. doc. 1869, no. 82)

Hatch, Israel T. Canal policy of 1870; "Old mortality" politicians—The canals are for the people—canals in Europe—New friends of the canals. 3p. O. 040 P v.2124  
From the *New York commercial advertiser*.

Low tolls and business on the canals. (see Commer. and finan. chron. 1870, 10:359-60, 741-42) 1400 and 1300 words. 332 qC73

Editorials on probable commercial advantages.

N. Y. (state)—Canal Department, Auditor of. Communication on reduction of tolls below rate of 1852. 2p. (Sen. doc. 1870, no. 77)

Niles, Hiram. Canal tolls; revision of rates of canal tolls, argument before the canal board at Albany, N. Y. (see Commercial union of the state of New York. Proceedings of the state convention, 1870, Appendix, p.87-97) 040 P v.2124

Reduced canal tolls and prospective railway earnings. Editorial. (see Commer. and finan. chron. 1870, 10:679) 1000 words. 332 qC73

Ward, Elijah. Our inland commerce, a free canal policy the best guarantee for its preservation and increase; speech in the city of New York, Mar. 9, 1870. 11p. O. N. Y. 1870. 040 P v.1947

Albany board of trade. Resolutions on proposed amendments to constitution relative to canal tolls. 2p. (Sen. doc. 1871, no. 58)

Commercial union of New York. Resolutions on amendments of constitution relative to canal tolls. 3p. (Sen. doc. 1871, no. 64; or, Ass. doc. 1871, no. 109)

New York, Chamber of commerce of. Memorial for reduction of canal tolls. 5p. (Sen. doc. 1871, no. 49)

Free canals; extracts from Governor Dix's message. 7p. O. Alb. 1873. 386

N. Y. (state)—Canal board. Resolutions adopted relative to the toll sheet for 1873. 2p. (Sen. doc. 1873, no. 17)

New York, Chamber of commerce of. Resolutions on canal tolls. 3p. (Ass. doc. 1873, no. 19)

— Memorial and resolutions in favor of amendment to constitution to authorize changes in rates of toll on canals without special act. 2p. (Ass. doc. 1873, no. 128)

— Resolution in regard to the canals of the state. 2p. (Sen. doc. 1873, no. 76)

Canals should be free commercial channels, only sufficient profit being made for repairs, interest on debt, and for sinking fund for redemption of debt.

New York produce exchange. Resolutions concerning canal tolls, free canal policy. 3p. (Ass. doc. 1873, no. 136)

Proposed amendments to constitution relative to canal tolls. 1p. (Ass. doc. 1873, no. 20)

Walker, Elmore H. State canal tolls, the diversion of trade from the city of New York and from the New York canals, report of the statistician of the New York produce exchange. (see New York produce exchange. Proceedings, Feb. 10, 1873, p.6-12) 040 P v.2124

N. Y. (state)—Canal board. Proceedings, relative to canal tolls. 2p. (Sen. doc. 1874, no. 33)

N. Y. (state)—Canal Department, Auditor of. Report on toll sheets of 1852 and 1873. 21p. (Sen. doc. 1874, no. 65)

New York, Chamber of commerce of. Additional resolutions referring to the amendment of the constitution for funding the canal debt. 4p. (Ass. doc. 1874, no. 86; or, Sen. doc. 1874, no. 68)

Albany board of lumber dealers. Memorial to the canal board for reduction of tolls, Feb. 24, 1875. (see Buffalo board of trade. Statement of trade and commerce for 1874, p.50-53) 381 B86

Also in *Proceedings of the canal board for 1875*, p.57-65 (386 N4264).

Buffalo board of trade, committee appointed by. Memorial for reduction of tolls, Feb. 20, 1875. (see N. Y. (state)—Canal board. Proceedings, 1875, p. 48-55) 386 N4264

N. Y. (state)—Canal board. Proceedings relative to canal tolls. 15p. (Ass. doc. 1875, no. 103)

— Resolutions, reports and toll sheet adopted. 14p. (Sen. doc. 1875, no. 73)

- N. Y. (state)—Canal board, Special committee of the. Report recommending a reduction in tolls, 1875. (*see* Buffalo board of trade. Statement of the trade and commerce for 1874, p.54-55) 381 B86
- N. Y. (state)—Canals, Committee on. Majority report in reference to canal tolls. 2p. (*Ass. doc.* 1875, no. 136) 381 N423
- Minority report, 2p. (*Ass. doc.* 1875, no. 137).
- New York produce exchange. Reduction of canal tolls; correspondence. (*see* Annual report, 1874-75, p.50-54) 381 N423
- Scatcherd, James N. Address of the Buffalo lumber carriers to the canal board, Feb. 24, 1875. (*see* Buffalo board of trade. Statement of trade and commerce for 1874, p.49-50) 381 B86
- Also in *Proceedings* of canal board for 1875, p.55-57 (386 N4264).  
Against high and discriminating tolls.
- N. Y. (state)—Canal board. Schedule canal tolls adopted by said board. 11p. (*Sen. doc.* 1876, no. 58)
- N. Y. (state)—Comptroller. Report, Feb. 27, 1877, on the possibility, without risk, of a reduction in the toll-sheet of 1876. 12p. O. 040 P v.477
- New York produce exchange. Resolutions, Apr. 7, 1876, and Feb. 1, 1877, urging upon the Legislature a continuance of low tolls. (*see* Annual report, 1875-76, p.40-41 and 1876-77, p.34) 381 N423
- Buffalo, Board of trade of. Communication tendering thanks for reduction of canal tolls. 1p. (*Ass. doc.* 1877, no. 134)
- Cheap water transportation. 15p. O. n.p. 1877. 386
- Signed by six business firms. Statements seconding argument on "Tolls and transportation" by Alonso Richmond. Other subjects are: steam canal boats, free canals, water route superior to railways.
- Husted, James W. Remarks in Assembly, Apr. 20, 1877, in favor of a reduction on canal tolls and in advocacy of a free canal system. 4p. O. n.p. n.d. 040 P fv.2124
- N. Y. (state)—Assembly. Resolutions relative to the rates of toll for 1877 on the Erie, Champlain, Oswego, and Cayuga and Seneca canals. 1p. (*Ass. doc.* 1877, no. 109)
- N. Y. (state)—Canal board. Proceedings relative to abolition of tolls on certain articles. 2p. (*Ass. doc.* 1877, no. 120)
- Request that the toll sheet be so modified as to permit reduction of fifty per cent of toll on domestic salt. 1p. (*Ass. doc.* 1877, no. 105)
- Schedule canal tolls adopted by said board. 19p. (*Ass. doc.* 1877, no. 67)
- New York canals and low tolls. (*see* Commer. and finan. chron. 1877, 25:28-29) 1900 words. 332 qC73
- Editorial favoring low tolls.
- Richmond, Alonzo. Tolls and transportation; a free canal essential to the state's prosperity and the water route demonstrated to be superior to the railways, Aug. 10, 1877. 35p. O. Buffalo, 1877. 386
- Sprague, E. C. The prosperity of the state and city of New York dependent upon free commerce upon the Erie canal; remarks in the Senate, May 3, 1877, upon the resolutions providing for a reduction of tolls upon the Erie canal. 16p. O. Buffalo, 1877. 040 P v.2124
- Alvord, Thomas G. Speech in support of the concurrent resolutions to amend the constitution by providing for a free canal, Feb. 27 and Mar. 12, 1878. p.27-46, O. Alb. 1878. 040 P v.2124 or 2438
- Published with speeches of I. I. Hayes and H. J. Hurd.
- Hayes, Isaac Israel. Speeches in support of the concurrent resolutions proposing amendments to the constitution relative to free canals, Feb. 27 and Apr. 10, 1878. p.3-15 and 47-73, O. Alb. 1878. 040 P v.2124 or 2438
- Speech of Apr. 10; also in *New York times*, Apr. 11, 1878. Published with speeches of H. J. Hurd and T. G. Alvord.
- Hepburn, A. B. The canals of the state, why tolls should not be abolished; speeches in the Assembly, Feb. 27 and Mar. 12, 1878. 22p. O. Albany, 1878. 040 P v.2124
- Replies to I. I. Hayes and T. G. Alvord against amendment to constitution.
- Hurd, Harvey J. Speech in support of the concurrent resolutions proposing amendments to the constitution relative to free canals, Feb. 27, 1878. p.17-26, O. Alb. 1878. 040 P v.2124 or 2438
- Published with speeches of I. I. Hayes and T. G. Alvord.

- N. Y. (state)—Canal Department, Auditor of. Communication on abandonment of tolls on Erie, Champlain and Oswego canals. 4p. (Ass. doc. 1878, no. 32) 386
- Communication relative to the rates of toll on the Erie, Oswego, Champlain, and Cayuga and Seneca canals. 8p. (Ass. doc. 1878, no. 34)
- Table of rates of toll for 1878.
- N. Y. (state)—Commissioners. Report of the commissioners invited by the canal board of New York, July 10, 1877, to consider and report on the subject of tolls upon the canals, having reference to the subject of revenues, and also to increasing the commerce of the canals. D: A. Wells, L. J. N. Stark and William Thurstone, commissioners. (see N. Y. (state)—Canal board. Proceedings, 1878, p.41-105) 386 N4264
- Richmond, Alonzo. A free canal essential to the state's prosperity with some ideas upon internal navigation; an address delivered before the Buffalo Board of trade Apr. 11, 1878. 8p. O. Buffalo, 1878. 386
- Seymour, Horatio. Advantages of low tolls; letter, Oct. 19, 1878. 7p. (in his Collected works. v.1) 308 Se91
- Facts for taxpayers; a speech before the canal committee of the Legislature of New York, Apr. 9, 1878. 16p. O. Utica, n.d. (in his Collected works. v.1) 308 Se91
- Favors taxing the state one million a year for the support of canals and abandoning tolls.
- Free canals. (see Commer. and finan. chron. 1879, 28:27-28) 1300 words. 332 qC73
- Editorial on canal finances.
- N. Y. (state)—Canal board. Schedule of canal tolls. 4p. (Ass. doc. 1879, no. 74)
- N. Y. (state)—Legislature. Concurrent resolutions relative to toll sheet for 1879. 1p. (Ass. doc. 1879, no. 86)
- New York, Chamber of commerce of. Resolutions in favor of abolishing canal tolls. 1p. (Ass. doc. 1879, no. 61)
- New York produce exchange. Resolutions on constitutional amendments relative to the canals, May 3, 1879. (see Annual report, 1879, p.77-78) 381 N423
- Proposed canal amendments to the constitution. Editorial. (see Commer. and finan. chron. 1879, 29:236-37) 1300 words. 332 qC73
- Ruggles, Thomas Colden. Letter on the Erie canal, May 26, 1879. (see New York produce exchange. Annual report, 1879, p.68-75) 381 N423
- Urges not only a free canal but a deep one.
- N. Y. (state)—Canal board. Schedule of canal tolls adopted by board, 1880. 7p. (Ass. doc. 1880, no. 76)
- Free canals. Editorial. (see Commer. and finan. chron. 1881, 32:274) 700 words. 332 qC73
- Importance of reform in canal tolls. (see Commer. and finan. chron. 1881, 32:246-47) 1300 words. 332 qC73
- Editorial on free tolls.
- N. Y. (state)—Canal board. Schedule canal tolls adopted by said board. 8p. (Sen. doc. 1881, no. 51)
- N. Y. (state)—Canal Department, Auditor of. Report on receipts of tolls on west-bound freights, 1879 and 1880. 4p. (Sen. doc. 1881, no. 33)
- N. Y. (state)—Legislature. Concurrent resolutions proposing amendments to article 7 of the constitution, and providing for the abolition of tolls on the canals and the maintenance thereof by taxation. (see N. Y. (state)—Public Works, Superintendent of. Annual report for 1881, p.203-4) 386 N425
- Seymour, Horatio, jr. Argument in favor of the abolition of tolls on west-bound freight, delivered before the canal board, Feb. 28, 1881. 22p. O. Alb. 1881. 386
- Free canals. (see N. Y. (state)—Engineer and Surveyor. Annual report for 1881, p.3-24) 626 L1
- Remarks in opposition to the reimposition of tolls on west-bound freight, before the canal board. 11p. O. Alb. 1881. 386
- The amendments and the future of the canals. (see Commer. and finan. chron. 1882, 35:560-61) 1500 words. 332 qC73
- Editorial against selling the canals, etc.

- The canals on judgment. (see Commer. and finan. chron. 1882, 35:474-75) 1400 words.  
332 qC73
- Editorial consideration of proposed constitutional amendments. -
- The free canal question again. Editorial. (see Commer. and finan. chron. 1882, 35:309-10)  
1400 words. 332 qC73
- N. Y. (state)—Canal Department, Auditor of the. Schedule of canal tolls for the Erie, Champlain, Oswego, and the Cayuga and Seneca canals. Sp. (Ass. doc. 1882, no. 37, or 56)
- N. Y. (state)—Legislature. Concurrent resolution relating to canal tolls. Sp. (Ass. doc. 1882, no. 56)
- New York produce exchange. Argument in favor of a free canal system, presented to the joint committees of the New York Legislature, Mar. 8, 1882. (see Annual report, 1882, p.82-94)  
381 N423
- Addreses by A. E. Orr, A. R. Gray, and W. H. Murtha.
- Noyes, William L. Remarks on the resolution to amend the constitution, under consideration in committee of the whole, Mar. 23, 1882. 13p. O. n.p. n.d. 386
- Against free canals.
- Seymour, Horatio. A free canal. 7p. O. n.p. 1882. (in his Collected works. v.2)  
308 Se91
- Favors reduction of toll, granting to railroads the right to carry freight.
- The free canal question—views on the subject. (see New York produce exchange. Annual report, 1882, p.95-99) 381 N423
- Letter to J. W. Higgins, Feb. 27, 1882.
- Letter to chairman of Senate canal committee expressing opinions in favor of the canal amendment, Mar. 31, 1882. 6p. O. (in his Writings collected. v.2) 308 Se91
- Clippings pasted in volume.
- Shall the canals be made free? a fair review of the question from an unbiased standpoint. 15p. T. n.p. n.d. 386
- From the *American dairyman*.  
Against the constitutional amendment.
- N. Y. (state)—Comptroller. Reduced tolls and freight charges have failed to increase the tonnage. (see Annual financial report relating to canals, 1883, p.14-19) 386 N4262

## CANAL TOLLS ON RAILROADS.

- See also Annual reports, Articles on construction and history of more than one canal, etc.
- N. Y. (state)—Canal commissioners. Report relative to allowing companies parallel with the Erie canal to transport passengers, furniture, etc., free of toll. 3p. (Ass. doc. 1839, no. 355)
- N. Y. (state)—Canals, Committee on. Report on the petitions for the repeal of act allowing companies to carry freight. 14p. (Ass. doc. 1845, no. 236)
- Memorial to the Legislature; canal tolls on railroad freight. (see Amer. R. R. jour. 1846, 19:106-8) 620.5 qJ2
- For the removal of the tolls.
- N. Y. (state)—Canal fund, Commissioners of. Report on amount of tolls on freight carried by railroads. 3p. (Sen. doc. 1846, no. 78)
- Report on omission to pay tolls on freight by the Auburn and Syracuse railroad. 3p. (Sen. doc. 1846, no. 106)
- N. Y. (state)—Railroads, Committee on. Report on complaints that freight had been carried on railroads without payment of canal tolls. 27p. (Ass. doc. 1846, no. 192)
- N. Y. (state)—Canals, Committee on. Report relative to subject of canal tolls on certain railroads. 8p. (Ass. doc. 1850, no. 131)
- N. Y. (state)—Finance, Committee on. Report on bills imposing tolls on railroads. 4p. (Sen. doc. 1850, no. 95)
- N. Y. (state)—Canal tolls on railroad freight, Senate Committee on. Reports of S. H. Johnson and a select committee on the subject of canal tolls on railroad freights, Feb. 28, 1851. 54p. (Sen. doc. 1851, no. 38)
- Reports of the several members of the committee in favor and against.
- N. Y. (state)—Railroads, Committee on. Report relative to canal tolls on railroads. 8p. (Sen. doc. 1851, no. 86)

- Railroad tolls. (*see* Amer. R. R. jour. 1851, 24:435-36) 500 words. 620.6 qJ3
- Local tax for the benefit of the canal revenue.
- N. Y. (state)—Canal fund, Commissioners of. Railroad tolls. (*see their* Annual report, 1854, p.25-29; 1855, p.16-20; 1856, p.30-46; 1857, p.16-19;) 386 N426
- N. Y. (state)—Governor. Message relative to reimposition of canal tolls on railroads. 6p. (Ass. doc. 1855, no. 97)
- N. Y. (state)—Ways and means, Committee on. Report relative to imposition of canal tolls on railroads. 16p. (Ass. doc. 1855, no. 107)
- Minority report relative to same subject, 8p. (Ass. doc. 1855, no. 143).
- Fitzhugh, Henry. Discrimination in canal tolls, tolling railroads, etc., report from the minority of the Canal board. 25p. O. Alb. 1857. 040 P v.1947
- N. Y. (state)—Canals, Committee on. Report of the minority on petitions for tolls on railroads of the state of New York, made Mar. 24, 1858. 13p. (Sen. doc. 1858, no. 99)
- N. Y. (state)—Governor. Message. (*see* Ass. jour. 1858, 81:122-23)
- "I recommend as an equivalent for reestablishing tolls on freight that railroad companies paying such tolls be allowed to make such equitable increase in passenger rates as the Legislature may authorize."
- Shall our railroads be taxed for the benefit of the Erie canal? (*see* Amer. R. R. jour. 1858, 31:200) 800 words. 620.5 qJ2
- Against canal tolls on railroads.
- N. Y. (state)—Attorney-General. Opinion on constitutionality of act of 1851 abolishing tolls on railroads. 9p. (Sen. doc. 1859, no. 33)
- 13p. (Ass. doc. 1860, no. 172)
- New York canals; report of the auditor. (*see* Amer. R. R. jour 1859, 32:200) 200 words. 620.5 qJ2
- Criticises arguments for tolls on railroads.
- Brooks, J. W. The pro rata question; what is the true policy of the state of New York. 21p. O. Alb. 1860. 040 P v.1947
- N. Y. (state)—Attorney-General. Communication in answer to a resolution of the Assembly relative to the constitutionality of the law abolishing tolls on railroads, transmitted Apr. 2, 1860. 13p. (Ass. doc. 1860, no. 172) 040 P v.1248
- N. Y. (state)—Conference, Committee of. Report relative to canal tolls on railroads. 27p. (Sen. doc. 1860, no. 90)
- N. Y. (state)—Governor. Message.
- Ass. jour. 1860, 83:18, 465-70; or, Sen. doc. 1860, no.47;
- Ass. jour. 1861, 84:15-16
- "I cannot doubt the wisdom or justice of reimposing for a few years a moderate rate per ton during the season of navigation upon all freight passing over railroads competing with canals."
- N. Y. (state)—Select committee. Report in relation to canal tolls on railroads. 18p. (Sen. doc. 1860, no. 35)
- N. Y. (state)—Ways and means, Committee on. Report relative to canal tolls on railroads. 8p. (Ass. doc. 1860, no. 119)
- Freight tolls on the New York railroads. (*see* Amer. R. R. jour. 1862, 35:409-10) 2000 words. 620.5 qJ2
- Railroad tolls no part of the revenues of the state canal; railroads are legally released from the payment of tolls.
- New York canal tolls imposed upon railroads; their repeal declared constitutional. (*see* Amer. R. R. jour. 1863, 36:360-61) 1900 words. 620.5 qJ2

### CANALS *versus* RAILROADS.

*See also* Annual reports, Articles on construction and history of more than one canal, etc.

N. Y. (state)—Inland navigation commissioners. Documents tending to prove the superior advantages of railways and steam carriages over canal navigation. 43p. O. N. Y. 1812. 386

Contains a quotation from James Madison, an extract of a letter from R. R. Livingston, Mar. 11, 1812 with answer by John Stevens, a memorial and other letters by John Stevens, and the report of the committee on the proposed wooden railway.

Smith, G. W. Comparison of the relative advantages of railroads and canals. (*see* Amer. R. R. jour. 1832, 1:370-73, 384, 386-87, 450-52) 14,000 words. 620.5 qJ2

Extracts from *Wood's Treatise on railroads* with additions by the American editor.

- N. Y. (state)—Canal commissioners. Report on resolution of Assembly relative to cost of canals and railroads. 48p. (Ass. doc. 1835, no. 296)
- ✓ A brief comparative view of the commercial advantages of these grand artificial avenues, completed or in progress of construction between the Atlantic and western waters. (see Amer. R. R. jour. 1836, 1:99) 071 xAll  
Railroads and canals have their respective advantages.  
The canals. (see Alb. daily argus, Mar. 18, 1837) 5300 words.  
Speech of M. H. Cash in the Assembly on his resolution calling for a suspension of operations under act authorizing the construction of the Black River and Genesee Valley canals.  
Railroads destined to supersede canals. (see Amer. R. R. jour. 1839, 9:3, 294-98) 300 and 620.5 J2  
✓ 1200 words.  
Signed "J. E. B."  
Comparative advantages of railways and canals. (see Amer. R. R. jour. 1840, 10:267-69) 500 words. 620.5 J2  
Signed "J. E. B."  
The Erie canal, its prospects for the future. (see Amer. R. R. jour. 1850, 23:775-76) 1200 words. 620.5 qJ2  
Railroad competition; necessity of reducing tolls 50 per cent.  
Flagg, A. C. Internal improvements of the state of New York. 34p. O. n.p. n.d. 040 P v.544  
From *Hunt's Merchant magazine*.  
✓ Enlargement of the Erie canal. (see Amer. R. R. jour. 1851, 24:683-84) 2100 words. 620.5 qJ2  
"The canal has made us what we are and must continue to sustain us."  
Erie canal; trade of the West. (see Amer. R. R. jour. 1851, 24:34-35) 1400 words. 620.5 qJ2  
Extracts from Governor Hunt's message and editorial comment. How to sustain the canal.  
Railroads vs. canals. (see Amer. R. R. jour. 1853, 26:250-51) 800 words. 620.5 qJ2  
Signed "J. E. B." Superior advantages of railroads over canals. Followed by editorial defending canals.  
The Erie canal. (see Amer. R. R. jour. 1854, 27:396) 1000 words. 620.5 qJ2  
Legitimate offices of canals and railroads are different; the railroad carries the merchant, the canal his property. An attack upon the indifference and hostility of some citizens to the public improvements of the state.  
N. Y. (state)—Engineer and Surveyor. Canals and railroads. (see his Annual report for 1855, p.5-14) 626 L1  
Syracuse canal convention, Committee appointed by. The "Syracuse address;" canal policy of New York in its connection with the railway system and the public interest. 15p. O. Buffalo, 1858. 040 P v.1233  
Also in *Proceedings of the New York state conventions*, published by Clinton league 1859, p.75-86 (040 P v.1248).  
✓ Another canal convention. (see Amer. R. R. jour. 1859, 32:632) 600 words. 620.5 qJ2  
An attack upon canal forwarders from the railroad side. Utica convention.  
Erie canal and competing railroad. (see Amer. R. R. jour. 1859, 32:24) 900 words. 620.5 qJ2  
Resolutions adopted at the Syracuse convention.  
Erie county (N. Y.)—Supervisors, Board of. Canals and railroads; report of a special committee of the board in relation to communications and documents from Messrs. Carlos Cobb and others. 8p. O. Buffalo, 1859. 040 P v.1248, or 1947  
Also in *Proceedings of state conventions*, published by Clinton league, 1859, p.100-4 (040 P 1248.).  
Monroe county (N. Y.)—Supervisors, Board of. Report of a select committee on the canal and railway policy. 4p. O. n.p. 1859. 040 P v.1248, or 1947  
N. Y. (state)—Railroads, Committee on. Report relative to the classification, tariff of prices, etc. on all freight transported on the railroads of this state. 10p. (Ass. doc. 1859, no. 166)  
New York central railroad. (see Amer. R. R. jour. 1859, 32:584-85) 1100 words. 620.5 qJ2  
The railroad is not carrying freight at a loss. Criticism of the silence of the railroad officials.  
Rochester state convention. Address concerning the commerce, agriculture and manufactures of the people of the state of New York, with reference to the canal system and railway management. (see Clinton league. *Proceedings of the New York state conventions*, 1859, Ed. 2, p.46-47) 040 P v.1248



**Ruggles, Samuel Bulkley.** Letter to the Rochester canal convention. (see Amer. R. R. jour. 1859, 32:577-79) 3000 words. 620.5 qJ2

Facts indicating the importance of the canals as an indispensable organ of commerce and the necessity of keeping them within public control. Also editorial on sale of the canals to the New York Central company.

**Clinton league.** Commercial policy of New York in connection with the canal system, the railway management and our state interests generally. 8+43p. O. Rochester, 1860.

380 or, 040 P v.1248

Contents: Address to the New York Produce exchange and business men generally; appeal from the southern tier of counties; review of the railroad freight policy of the state of New York, including the argument before the Assembly select committee for the pro rata freight bill and the report, also opinions of the press; address by Dr. Sanford B. Hunt on "Effect of railroad discrimination upon agricultural interests."

**New York, Chamber of commerce of.** Remonstrance against the passage of an act in relation to the transportation of freight on the several railroads of this state. 5p. (Ass. doc. 1860, no. 59)

**N. Y. (state)—Canal Department, Auditor of.** Railway competition. (see Annual financial report for 1862, p.27-30) 386 N4261

**Canals vs. railroads; commercial facilities with the West.** (see Commer. and finan. chron. 1865, 1:260-61) 1300 words. 332 qC73

Editorial review of transactions of commercial convention, Detroit.

**Ludington, Clinton V. R.** Canals and state finances; remarks delivered in New York state constitutional convention, Sept. 12, 1867. 7p. O. Alb. 1867. 342.7472 M7

Advantages of canals do not warrant the levying of heavy taxes on state; it is better to aid railroads.

**Tilden, Samuel J.** New York state finances and canals; speech in the constitutional convention, Sept. 11, 1867. 38p. O. 386

Also in his *writings and speeches*, 1:347-93 (308 T45).

Opposed to change of locks unless prism of canal is enlarged.

Canals not superseded by railways.

**New York, Chamber of commerce of.** Memorial in reference to the rates of freight on the railroads of the state. 6p. (Ass. doc. 1868, no. 143)

**Frick, William.** Land transportation by railroad vs. water transportation by canal; an answer as to which is the cheaper mode of moving heavy, bulky articles, considered in connection with canal steam train-towing. 21p. illus. O. Phil. 1869. 040 P v.2124

**King, Charles A.** Speech on competition and cheap transportation on the state canals. (see Commercial union of the state of New York. Proceedings of the state convention, 1870, p.75-79) 040 P v.2124

**McAlpine, William Jarvis.** Extract from speech in 1868 on canals vs. railroads, (see U. S.—Engineer department. Report for 1871, p.646-47) N. Y. state law lib.

**Edson, Franklin.** Letter in regard to the economy of transport from the West to New York, by water and by rail, Dec. 6, 1873. (see U. S.—Senate—43d Cong. 1st Sess. Rep. 307, pt.1, Appendix, p.175-77)

**Walker, Elmore H.** Diversion of trade from New York. (see New York produce exchange. Annual report, 1874-75, p.231-42) 381 N423

Also in pamphlet form (040 P v.2124)

**Richmond, Alonzo.** Impossible for railroads to compete successfully with the water routes. (see his *Tolls and transportation*, 1877, p.20-26) 386

A canal railroad project. (see Commer. and finan. chron. 1878, 26:201-3) 2000 words.

332 qC73

Editorial describing and commending the project.

**Peck, Dewitt C.** Canals and railroads. 9p. O. Alb. 1878. 040 P v.2438

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- The canal and New York grain receipts. (*see Commer. and finan. chron.* 1887, 44:105-7) 2200 words. 332 qC73  
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- Jeans, James Stephen. Cost of water and land transport. (*see his Waterways and water transport in different countries*. 1890. p.379-81) 386 J34
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- Editorial on railways vs. canals. (*see Bradstreet's*, 1899, 27:465) 250 words. 330.5 fB72
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The revolution in railway transportation. (see Eng. news, Oct. 26, 1899, 42:272-74) 2500 words. 620.5 fN4

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Corthell, E. L. Reply to circular letter of May 1, opposing further expenditure of large sums on canal enlargement and arguing in favor of railroad transportation. (see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.71-93) 386 N4269  
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Hewitt, Abram S. Views on reduction of railroad rates and against further expenditure for improving the canals at the present time; reply to circular letter of May 1. (see N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.150-52) 1100 words. 386 N4269

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Quinn, C. H. The Erie canal and freight rebates; how the Erie canal will emancipate the shippers of the Middle West. (see World to-day, 1906, 10:164-70) 030 qC93

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- Ringwalt, John Luther. Effect of the completion of the Erie canal. (*see his* Development of transportation systems, 1888, p.45-46) 388 qR47
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- ✓ Trade of the canals; the grain crop. Editorial. (*see* Alb. daily argus, Oct. 28, 1836) 900 words. 071 xA11
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Ass. doc. 1838, no. 69  
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 " 1843, no. 186  
 " 1844, no. 173  
 " 1845, no. 49  
 " 1846, no. 220

Ass. doc. 1847, no. 38  
 " 1848, no. 184  
 " 1849, no. 231  
 " 1850, no. 187  
 " 1857, no. 207  
 " 1858, no. 150  
 " 1865, no. 27  
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✓ Commerce and wheat trade of Black Rock and Buffalo. (see Alb. evening jour. July 12, 1839) 800 words.

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Dearborn, Henry Alexander Scammel. Letters on the internal improvements and commerce of the West. p.1-65, O. Bost. 1839. 398 D34

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 Communication concerning lumber transportation.

Extracts from the annual report of the board of canal commissioners of the state of New York, Jan. 25, 1841. (see Journal of Franklin institute, Jan. 1841, 32:87-92) 605 J6  
 Chiefly statistics.

N. Y. (state)—Canal fund, Commissioners of. Report respecting the tonnage of the Erie canal. 4p. (Ass. doc. 1841, no. 193)

✓ Casey, W. R. On the spring trade of the cities of New York and Boston with the western states by way of the Great Lakes. (see Amer. R. R. jour. 1842, 14:235-48) 4000 words.

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No amelioration can be expected so long as there is no freedom of choice in routes for western trade.

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Tables of official valuation of taxable property, 1815-25 and 1825-35.

Internal improvements. (see Fisher's national mag. 1845, 1:183-88, 284-88, 363-73)

305 F53

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Commerce of New Orleans and of the Erie canal. (see Amer. R. R. jour. 1847, 20:613)

620.5 qJ2

Shows success of New York commerce in breadstuffs in 1847.

Genesee Valley canal. (see Amer. R. R. jour. 1847, 20:282) 500 words. 620.5 qJ2  
 A profit to the state, not an expense, 1840-46.

Erie canal vs. the Mississippi river. (see Amer. R. R. jour. 1851, 24:294) 250 words.

620.5 qJ2

✓ Comparative statement showing the tolls, trade and tonnage of the New York state canals, and the progress in commerce, navigation, population and valuation, of the four principal Atlantic cities, and the foreign commerce of the United States, from 1820 to 1851 inclusive, p.4-5 and 277-90, O. (U. S.—Senate—32d Cong. 1st Sess. Ex. doc. 12; or, House—32d Cong. 1st Sess. Ex. doc. 136)

✓ Erie canal. (see Amer. R. R. jour. 1852, 25:279-80) 620.5 qJ2

Tabular statements of average tonnage of a boat, the time and cost to bring a barrel of flour from Buffalo to Albany, the lockages at Alexander's Lock and the total tonnage from the canal at tide-water for 10 or more years.

What is the nearest point on Lake Erie to the Atlantic cities? (see Amer. R. R. jour. 1852, 5:59) 620.5 qJ2

Importance of Erie canal to Buffalo.

- ✓ **N. Y. (state)—Engineer and Surveyor.** Report on freight carried by railroads between lakes and tide-water. 56p. (Sen. doc. 1853, no. 59)
- N. Y. (state)—Commerce and navigation, Committee on.** Report on bill to incorporate companies to navigate canals of this state. 7p. (Ass. doc. 1854, no. 16)
- Minority report. 2p. (Ass. doc. 1854, no. 32)
- N. Y. (state)—Select committee.** Report on so much of the Governor's message as relates to the navigation of the northern rivers. 3p. (Sen. doc. 1854, no. 91)
- Canals of Ne York.** (see Amer. R. R. jour. 1855, 28:69-70) 1300 words. 620.5 qJ2
- Extracts from Auditor's report regarding business of the year.
- Memorial to the Legislature upon the present state of the canals, the necessity of their enlargement and upon the effects of the passage of the western trade through the Welland and Oswego canals.** 15p. O. Alb. 1857. 040 P v.258
- Clinton league.** Commercial policy of New York with reference to the agricultural and manufacturing interests of the state in connection with the canal system, the railway management and our state interests generally; to the supervisors of the state. (see its Proceedings of the New York state conventions. 1859. Ed. 2. p.95-98) 040 P v.1248
- ✓ **Hunt, Sanford B.** The farming interest of western New York as affected by various means of transportation to the East and the West; address delivered before the Genesee county agricultural society, Sept. 15, 1859. (see Clinton league. Proceedings of the New York state conventions. 1859. Ed. 2. p.105-11) 040 P v.1248
- ✓ **N. Y. (state)—Canal Department, Auditor of.** Communication relative to the business of the canals, number of boats now in use, their value, etc. 1p. (Ass. doc. 1859, no. 161)
- New York, Chamber of commerce of.** Annual report, 1858-date. v.1-date. O. N. Y. 1859-date. 381 N42
- Resolutions, reports, etc. on current questions relating to the canals.
- Tabular statements of transportation on the canals.
- New York canals.** (see Amer. R. R. jour. 1859, 32:219) 620.5 qJ2
- ✓ **From Albany evening journal.** Some historical notices of progress of trade on the Erie canal and its influence on internal commerce of the country.
- Utica state convention.** Discussion of the commercial policy of the state with reference to her agricultural, manufacturing and commercial interests; proceedings, Sept. 28, 1859. (see Clinton league. Proceedings of the New York state conventions. 1859. Ed. 2. p.49-74) 040 P v.1248
- Contains speeches by A. H. Hovey, Ansel Bascom, S. B. Hunt, T. G. Alvord, B. F. Cooper, Carlos Cobb, Thomas Parsons, D. C. Littlejohn, H. B. Miller, Henry O'Reilly, L. B. Crocker and S. F. Sarvin.
- N. Y. (state)—Attorney-General.** Opinion on what constitutes a "navigable" stream. 4p. (Sen. doc. 1860, no. 57)
- N. Y. (state)—Canal Department, Auditor of.** Report on trade and tonnage of Champlain canal. 8p. (Sen. doc. 1860, no. 26)
- ✓ **Buffalo committee of public defense.** Report on the vessels, commerce and trade of the lakes and Erie canal and of the commercial business of Buffalo. 15p. O. Buffalo, 1862. 381
- Johnson, Edwin F.** The navigation of the lakes and navigable communications therefrom to the seaboard and to the Mississippi river, and relation of the former to the lines of railway leading to the Pacific. 48p. illus. O. Hartford, 1866. 386
- ✓ **N. Y. (state)—Canal Department, Auditor of.** Are we secure against the diversion and loss of the western trade? (see Annual financial report, 1866, p.41-48) 386 N4261
- Genesee Valley canal.** (see Amer. R. R. jour. 1867, 40:287) 110 words. 620.5 qJ2
- Statement from McKean Miner on the value of above canal for carrying coal.
- N. Y. (state)—Canal Department, Auditor of.** Communication relative to the tons of property which have been moved over the Oneida Lake canal from 1849 to 1864 inclusive, the amount of tolls paid on that tonnage, etc. 3p. (Ass. doc. 1867, no. 150)
- Letters on the necessity of cheapening transport between the West and the ocean, addressed to the Milwaukee sentinel and Chicago tribune by "a western trader."** 16p. O. Milwaukee, 1868. 040 P v.1825
- Hatch, Israel T.** Report upon the commercial relations of the United States with the Dominion of Canada, transmitted to the House of Representatives, Jan. 12, 1869. 27p. O. Wash. 1869. 040 P v.1947

Walker, Elmore H. comp. Statistics on grain exports from the Lake regions, 1860-69. (*see* Commercial union of the state of New York. Proceedings of the state convention. 1870. Appendix, p. 101-9) 040 P v.2124

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Rates of towing grain canal-boats, statistics of different articles of produce, etc.

Buffalo board of trade. Cheap transportation. (*see their* Statement of trade and commerce for 1874, p.137-38) 381 B86

N. Y. (state)—Canal Department, Auditor of the. Report transmitted Jan. 1875; extracts. (*see* Buffalo board of trade. Statement of trade and commerce for 1874, p.35-43) 381 B86

N. Y. (state)—Governor. Message. (*see* Ass. jour. 1874, 97:23-24)  
Importance to the state.

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Advantage to New York city.

The necessity to commerce of cheap water communication between the West and the East, addressed to the farmers of Ohio, Indiana and Illinois. 12p. O. Toledo, Ohio, 1877. 380

Beadle, Frank. The American water route from Chicago to New York. (*see* N. Y. (state)—Engineer and Surveyor. Annual report for 1878, p.21-34) 626 L1

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Richmond, Alonzo. How to cheapen transportation on the lakes. Letter. (*see* N. Y. (state)—Engineer and Surveyor. Annual report for 1878, p.49-53) 626 L1

Stevens, J. G. The Erie canal and its relations to the city of New York. (*see* Scribner's monthly, 1878, 15:117-25) 051 Scr31

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Richmond, Alonzo. Causes determining the price of transportation on the Erie canal. Letter. (*see* N. Y. (state)—Engineer and Surveyor. Annual report for 1879, p.14-17) 626 L1

Statement of comparative movement of property on canals and railroads, 1853-78. 1p. table. (Sen. doc. 1879, no. 58)

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Gear, John H. Utility of the Erie canal. (*see* River and canal improvement convention, Davenport, Ia. 1881, p.30) 387

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Address, Nov. 1881; considers their relation to commerce.

Thurstone, William. Trade and commerce of Buffalo; lake and railroad commerce. p.9-24, O. Buffalo, 1883. 381

Seymour, Horatio. Address before the Canal improvement conference, held at Utica, Aug. 19, 1885. 4p. O. (*in his* Collected works. v.2) 308 Se91

Canal improvement document, no.11.

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The same volume contains newspaper clippings and other matter on canals by ex-Governor Seymour.

Thurstone, William. Statement in regard to the canals of New York, St. Lawrence river navigation, the railroad transportation interests of Canada, the commercial, industrial and transportation interests of Buffalo, and historical facts of interest in regard to transportation. p.403-500, tables. O. (U. S.—House —48th Cong. 2d Sess. Ex. doc. 7, pt.3, Appendix no. 72)

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- ✓ How and why the canal has increased its grain traffic. Editorial. (*see* Commer. and finan. chron. 1887, 45:842-44) 2000 words. 332 qC73
- The value of the canals. 3p. O. (Canal improvement doc. 40) 1000 words. 386  
From *New York times*, Feb. 17, 1888.
- Fanton, Hull. Speech at the annual convention for the protection of canal commerce and the canals of the state of New York, Feb. 13, 1889. 4p. O. (Executive and vigilant committee, Series of 1889, Doc. 2) 386
- Speech before the joint committee on canals of the Senate and Assembly, Mar. 14, 1889, on the Langbein-Tefft bill. 14p. O. (Executive and vigilant committee. Series of 1889, Doc. 5) 386
- Resolutions adopted at the annual convention for the protection of canal commerce and the canals of New York, held Feb. 13, 1889. 4p. O. (Executive and vigilant committee. Series of 1889, Doc. 1.) 386
- Haupt, Lewis M. Canals and their economic relation to transportation. (*see* Amer. econ. assoc. 1890, 5:333-57) 330.6 Am3  
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- U. S.—Census, 11th, 1890. Report on transportation business in the United States. v.11, pt.20, p.467-88, tables, F. (U. S.—House—52d Cong. 1st Sess. Mis. Doc. 50) 317.3 qUn3  
Transportation on canals and canalized rivers.
- N. Y. (state)—Governor. Message. (*see* Ass. jour. 1894, 117:21-24)  
Usefulness to the state. Plans for increasing tonnage.
- N. Y. (state)—Senate. Preamble and resolution by Mr. Grady relative to amount of grain received at Buffalo for shipment by Erie canal in 1895 as compared with 1890. 2p. (Sen. doc. 1896, no. 21)  
——— Reply to resolution. (Sen. doc. 1896, no. 31)
- Laughlin, John. Shall the commerce of our free canals be monopolized by a foreign trust? Speech in opposition to the Parshall bill, Feb. 9, 1897. p.3-13, T. 386  
Against giving the right to increase the amount of capitalization a corporation may invest in the navigation of the Erie canal, from \$50,000 to \$4,000,000.
- N. Y. (state)—Public Works, Superintendent of. Some remedies for decline in canal traffic suggested. (*see* his Annual report on canals for 1897, p.9-13) 386 N425
- ✓ Wheeler, Charles E. The commerce of the American Great Lakes. (*see* Iron age, Nov. 18, 1897, p.4-5) 2800 words. 671 qL5  
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N. Y. (state)—Canal board. Report relative to supplying Erie canal with water from Lake Erie, to Seneca river. 2p. (Ass. doc. 1839, no. 381)

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——— Report on surveys of Honeoye, Conesus, Canadice and Hemlock lakes, relative to use as reservoirs, with seven maps. 40p. (Sen. doc. 1850, no. 40)

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——— Report on use of water from Erie canal. 3p. (Ass. doc. 1870, no. 50)

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## USE OF SURPLUS WATERS.

*See also* Annual reports, etc.

An act for the relief of the owners of hydraulic privileges, in cases where dams are erected by the canal commissioners. 1p. (Ass. doc. 1823, no. 163)

N. Y. (state)—Canal commissioners. Report on petition of A. G. Lansing for damage; also against letting at this time hydraulic privileges from the canal. (*see* Sen. jour. 1823, 46:149-49)

N. Y. (state)—Canals, Committee on. Report on the petition of Barent Bleeker and others, for use of surplus waters of Lake Champlain at Fort Miller. 1p. (Ass. doc. 1823, no. 162)

An act relative to the surplus waters created by the erection of dams for the supply of the Erie and Champlain canals. 2p. (Sen. doc. 1824, no. 148)

N. Y. (state)—Canal commissioners. Report in relation to the surplus water of the Erie and Champlain canals and the Salina side-cut. (Ass. jour. 1824, 47:745-46)

N. Y. (state)—Canals, Committee on. Report in relation to the expediency of leasing the water privileges on the northern canal. 1p. (Sen. doc. 1824, no. 147)

N. Y. (state)—Canal Commissioners. Report concerning the erection of hydraulic works on the Erie and Champlain canals. 3p. (Ass. jour. 1825, 48:393-95; or, Ass. doc. 1825, no. 61)  
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 Location and revenues of said privileges, etc.

An act relating to drawing water from the canals for hydraulic purposes, and regulating the manner of selling the same. 3p. (Sen. doc. 1826, no. 228)

N. Y. (state)—Canal commissioners. Report on memorial of inhabitants of Manlius, Cicero and Sullivan, in relation to the use of water of the Chittenango, Limestone, Butternut and Cowasselon creeks. (Sen. doc. 1826, no. 172; or, Sen. jour. 1826, 49:308-10)

——— Report on petitions of inhabitants of German-flats, complaining of uses made of feeder from Steele's creek. (*see* Ass. jour. 1826, 49:756)

——— Report relative to proceedings under third section of the act concerning the Erie and Champlain canals, passed Apr. 20, 1825; and at what places, in their opinion, surplus water may be spared from the canals or works connected therewith. (*see* Sen. jour. 1826, 49:191-96)

N. Y. (state)—Canals, Committee on. Report on memorials of the inhabitants of Syracuse containing certain charges and complaints against the proceedings of the canal commissioners in the sale of the surplus waters upon the middle section of the Erie canal. (*see* Sen. jour. 1826, 49:391-411)

Testimony referred to in report, Appendix C, 22p.

——— Report on six memorials, three of which are from inhabitants of Manlius, Cicero and Sullivan, relative to the use of surplus water of Erie canal. (Sen. jour. 1826, 49:418-22)

——— Report on unreasonable use of canal water by those having hydraulic privileges. (*see* Ass. jour. 1826, 49:906)

N. Y. (state)—Judiciary, Committee on the. Report on a petition of several towns in the county of Jefferson, relative to "an act to authorize the diversion of the surplus waters of the Black river into Pleasant and Stony creeks," passed Apr. 20, 1825. (see Sen. jour. 1826, 49:366-69)

N. Y. (state)—Canals, Committee on. Report on petition of Archibald McIntyre for certain water privileges on canal between Mohawk river and Albany. (see Sen. jour. 1827, 1st sess. 50:112-13)

An act concerning the surplus waters of the state, passed Apr. 21, 1828. (see Laws of New York)

An act, passed Apr. 14, 1828, amendatory of "an act to amend the act, passed Apr. 20, 1825, entitled 'an act to authorize the diversion of the surplus waters of Black river into Pleasant and Stony creeks, in the county of Jefferson, passed Apr. 17, 1826.' " (see Laws of New York)

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Report on petition of inhabitants residing near the Oswego river for an amendment of the law in relation to the sale of the surplus waters. (see Ass. jour. 1828, 51:655)

N. Y. (state)—Canals, Committee on. Report on petition of George Sandford for so much of the surplus water of the Glens Falls feeder as necessary to operate a flax and hemp dresser. (see Sen. jour. 1828, 1st sess. 51:229-30)

An act to authorize the commissioners for "the diversion of the surplus waters of Black river" to levy a tax to effect that object, passed Apr. 28, 1829. (see Laws of New York)

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From *Lockport courier*. Signed "X. Y. Z." Concerning disposal of surplus water at Lockport.

N. Y. (state)—Select committee. Report on petition for privilege for Erastus Bailey to erect mills and other machinery on the Genesee river. 1p. (Ass. doc. 1830, no. 375)

The water-power. (see Alb. daily advertiser, Jan. 7, 1830) 6200 words. N. Y. state lib.

From *Lockport journal*. Concerning surplus water at Lockport.

(see Alb. daily advertiser, Jan. 9, 1830) 2400 words. N. Y. state lib.

From *Lockport courier*. Letter from L. A. Spalding.

Memorial of L. A. Spalding relative to surplus waters at Lockport. 19p. (Ass. doc. 1831, no. 55)

Memorial of the inhabitants of Niagara county relative to surplus waters at Lockport. 7p. (Ass. doc. 1831, no. 61)

N. Y. (state)—Canal commissioner. Communication from Commissioner Henry Seymour on L. A. Spalding's memorial relative to surplus waters at Lockport. 1p. (Ass. doc. 1831, no. 121)

N. Y. (state)—Canals, Committee on. Report on the memorial of L. A. Spalding relative to surplus waters at Lockport, and the several documents associated with same. 156p. (Ass. doc. 1831, no. 280)

Report on the petitions relative to the use of surplus waters of the Erie canal. 3p. (Ass. doc. 1831, no. 355)

Report relative to use of waters of Champlain canal by J. F. King. 3p. (Sen. doc. 1831, no. 53)

Remonstrance of Lot Clark against L. A. Spalding's memorial relative to surplus waters at Lockport. 23p. (Ass. doc. 1831, no. 91)

Talcott, George. Communication relative to the use of the surplus waters of the Erie canal by the United States at Watervliet. 1p. (Ass. doc. 1831, no. 207)

N. Y. (state)—Canal board. Report on petition of Frederick Bellinger for additional water privileges upon the Erie canal. 2p. (Ass. doc. 1833, no. 265)

N. Y. (state)—Canal commissioners. Report on petition of J. E. Bloomfield relative to lease of surplus water of canal at Utica. 6p. (Sen. doc. 1833, no. 112)

- N. Y. (state)—Canals, Committee on.** Report on resolution instructing the canal commissioners to resume the leasing of the surplus water of the Oswego canal. 2p. (Sen. doc. 1833, no. 57)
- N. Y. (state)—Canal commissioners.** Report on petition of D. H. Richardson for use of surplus waters of Erie canal. 1p. (Ass. doc. 1834, no. 298)
- Report on petition of J. Enders for use of surplus waters of canal. 2p. (Ass. doc. 1834, no. 237)
- Report on petition of Vincent Conklin and others for use of surplus waters of canal for milling purposes. 4p. (Sen. doc. 1834, no. 78)
- Report on petitions of inhabitants of Wayne county and others, for use of waters of Erie canal at Lockville. 6p. (Ass. doc. 1834, no. 287)
- Lynch, A. and others. Remonstrance addressed to the canal board of New York against the use and abuse of the waters of the Erie canal, for hydraulic purposes, particularly in reference to the Rome level. 40p. map. O. N. Y. 1835. 040 P v.145
- N. Y. (state)—Canal board.** Report on petition of D. W. Wing and others for use of surplus waters of Champlain canal. 11p. (Sen. doc. 1835, no. 74)
- N. Y. (state)—Canal commissioners.** Report on petition of B. J. Swartwout for use of surplus water of state dam, Glens Falls feeder. 8p. (Ass. doc. 1835, no. 341)
- Report on petition of inhabitants of Monroe county, for use of surplus waters of canal. 2p. (Ass. doc. 1835, no. 83)
- Report on petition of J. N. Hicks for use of surplus waters of canal to operate pump at salt springs in Liverpool. 5p. (Ass. doc. 1835, no. 347)
- Report on petition of Vincent Conklin and others for use of surplus waters of Chemung canal. 2p. (Ass. doc. 1835, no. 91)
- N. Y. (state)—Canal board.** Report on petition of W. A. Bird and others for use of surplus waters at Black Rock dam. 3p. (Ass. doc. 1836, no. 228)
- N. Y. (state)—Canal commissioners.** Report on memorial of residents in Onondaga and Madison counties relative to surplus waters of canals. 11p. (Sen. doc. 1836, no. 80)
- Report on petition of Charles Orwan for use of surplus waters of Chemung canal. 3p. (Ass. doc. 1836, no. 107)
- Report on petition of John Gregg for use of surplus waters of Chemung canal. 2p. Ass. doc. 1836, no. 108.
- 2p. Ass. doc. 1837, no. 77.
- Report on petition of O. Culver for use of surplus waters of Erie canal. 7p. (Ass. doc. 1836, no. 268)
- Report on resolution of Assembly and on petition of inhabitants of Liverpool relative to use of water from Oswego canal to pump salt water. 5p. (Ass. doc. 1837, no. 93)
- N. Y. (state)—Select committee.** Report on petition for lease of surplus waters of Glens Falls feeder. 2p. (Ass. doc. 1837, no. 259)
- N. Y. (state)—Canal commissioners.** Report on petition of Aaron Parkhurst and J. W. Drum for use of surplus waters of Erie canal. 3p. (Ass. doc. 1838, no. 197)
- N. Y. (state)—Canal board.** Report on resolution of Assembly relative to leasing surplus waters of Oswego canal. 5p. (Ass. doc. 1839, no. 370)
- N. Y. (state)—Canals, Committee on.** Report on memorial of C. P. Dunham and others concerning surplus waters of the Erie canal. 2p. (Ass. doc. 1839, no. 51)
- N. Y. (state)—Canal commissioners.** Report relative to leasing the surplus waters of the Glens Falls feeder dam. 2p. (Sen. doc. 1840, no. 114)
- N. Y. (state)—Canals, Committee on.** Report on the petition of Aaron Parkhurst and J. W. Drum, for a grant of surplus waters of the Erie canal at Arcadia. 3p. O. (Ass. doc. 1840, no. 99)
- N. Y. (state)—Canal board.** Report on the petition of W. A. Bird in relation to surplus waters at Black Rock. 2p. (Sen. doc. 1841, no. 57)
- N. Y. (state)—Canal commissioners.** Report on the petition of inhabitants of Camillus for the use of surplus waters of the canal. 3p. (Ass. doc. 1841, no. 206)



N. Y. (state)—Canal commissioners. Report on uses of water from Oneida Lake canal and feeder for milling purposes. 3p. (Ass. doc. 1843, no. 45)

N. Y. (state)—Canals, Committee on. Report on application of Rhoderick Price for permission to use surplus waters of Erie canal at three locks in town of Arcadia, Wayne county. 2p. (Ass. doc. 1845, no. 152)

Marsh, Daniel. Report on the diversion of the water from the Genesee river, to the committee appointed by the owners and occupants of water-power in Rochester. 16p. O. Rochester, 1846. 040 P v.1233

N. Y. (state)—Canal board. Report on use of surplus waters of Chenango canal. 18p. (Ass. doc. 1846, no. 195)

N. Y. (state)—Canals, Committee on. Adverse report in relation to the Niagara river hydraulic company. 7p. (Sen. doc. 1846, no. 30)

——— Report on petition of inhabitants of Lenox, Madison county, to have surplus waters restored to individual and hydraulic purposes. 1p. (Ass. doc. 1846, no. 130)

Rochester, citizens. Memorial of the inhabitants of Rochester interested in the use of the waters of the Genesee, for hydraulic purposes, to the Legislature of New York. 14p. O. Rochester, 1846. 040 P v.223

N. Y. (state)—Canal board. Report on petition of town of Lenox relative to surplus waters of Rome level. 5p. (Ass. doc. 1847, no. 109)

N. Y. (state)—Attorney-General. Opinion on claim of Mrs. Maria Miller arising from lease of surplus waters of canals. 5p. (Ass. doc. 1851, no. 95)

Memorials of the owners of water of the Genesee river at Rochester to the Legislature of New York, Feb. 1852 and Jan. 1853. 2 nos. in 1, O. Rochester, 1852-53. 040 P v.223

N. Y. (state)—Claims, Committee on. Report on the memorial of owners of the water of the Genesee river at Rochester. 3p. (Ass. doc. 1853, no. 86)

Rights of the owners of hydraulic works at Waterloo. 14p. O. Waterloo, 1855.

040 P v.227

Memorial, submitted to the canal board by owners of water-power in Little Falls, in respect to the uses of the waters of the Mohawk river, July 12, 1856. 8p. O. 040 P v.1947

N. Y. (state)—Canal Department, Auditor of. Report on surplus waters leased in Black Rock harbor. 3p. (Ass. doc. 1857, no. 204)

N. Y. (state)—Attorney-General. Lockport water claims. 10p. O. n.p. 1861

040 P v.1233

Opinion relative to the surplus waters of the canal at Lockport, and the lessees thereof.

N. Y. (state)—Canal board. Resolutions relative to act concerning salt springs, etc. 2p. (Sen. doc. 1861, no. 42)

——— Report on granting of surplus waters of Erie canal to private parties. 3p. (Ass. doc. 1868, no. 124)

N. Y. (state)—Canals, Special committee on leases and uses of. Report concerning canal waters. 66p. (Ass. doc. 1870, no. 139)

N. Y. (state)—Canal Department, Auditor of. Report on amount paid by the state since 1846 for furnishing the canals with water; also list of those drawing water from the canals for mechanical purposes, etc. 5p. (Ass. doc. 1874, no. 45)

Greenleaf, James L. Report on the water-powers of the drainage basins of Lakes Huron and Erie, with report on the water-power of Niagara river. p.487-512, Q. (U. S.—House—47th Cong. 2d Sess. Mis. doc. 42, pt.16) 317.3 qUn3

Part of United States census report, 1880.

Porter, Dwight. Water-power of the region tributary to Long Island Sound (p.161-333); the water-power of the Hudson river basin and of Lake George outlet (p.335-411); the water-power of the region tributary to Lake Ontario and of the New York State canals (p.413-85). p.161-485, Q. (U. S.—House—47th Cong. 2d Sess. Mis. doc. 42, pt.16) 317.3 qUn3

Part of United States census report, 1880.

Comstock, George F. Argument in the matter of the application of the city of Syracuse for permission to divert the waters of Skaneateles lake. O. n.p. 1889.

N. Y. (state)—Attorney-General. Opinion whether the Legislature has power to grant the use of the waters of Skaneateles lake to any person or corporation, the same being a part of the canal system of the state. 4p. (Ass. doc. 1889, no. 95)

- Erie canal. (see *The engineer*, 1896, 81:155) 150 words. 620.5 fL6  
 Against renewal of rights to mill owners to use surplus waters; for a direct towing electric  
 motor running on a track on the tow-path.
- Surreptitious use of Erie canal waters. (see *Eng. news*, 1899, 42:225) 620.5 fN4  
 N. Y. (state)—Engineer and Surveyor. Inquiries regarding water-powers of New York state.  
 (see *his* Annual report for 1901, p.609-16) 626 L1

## CANAL LANDS.

See also Annual reports etc.

- N. Y. (state)—Canal commissioners. Communication relative to cession of land for canals.  
 3p. (Ass. doc. Apr. 3, 1817)  
 Also in *Public documents*, compiled by C: G. Haines, 1821, p.259-64 (386 H12).
- N. Y. (state)—Canals, Committee on. Report on communication of George Talcott concern-  
 ing that portion of canal passing through lands at Watervliet ceded to U. S. 2p. (Ass. doc.  
 1831, no. 361)
- N. Y. (state)—Claims, Committee on. Report on petition of A. L. Elmore for release of unused  
 canal land. 1p. (Ass. doc. 1831, no. 337)
- N. Y. (state)—Attorney-General. Report on a resolution to inquire whether any further  
 legislative aid is necessary to protect the titles and secure the public property constituting the  
 canals. 4p. (Ass. doc. 1833, no. 10)
- N. Y. (state)—Canal commissioners. Report on petition of Buffalo and Black Rock railroad  
 company to intersect state lands. 2p. (Ass. doc. 1834, no. 84)
- N. Y. (state)—Railroads, Committee on. Report on petition of president and directors of the  
 Buffalo and Black Rock railroad company, for authority to intersect state lands. 1p. (Ass.  
 doc. 1834, no. 134)
- N. Y. (state)—Comptroller. Report in relation to sales of lands near Oswego canal, and con-  
 tribution to and diversions of tolls from Erie canal, by lateral canals. 24p. (Sen. doc. 1836,  
 no. 73)
- N. Y. (state)—Canal commissioners. Report on petition of Cohoes company for a grant of a  
 certain portion of the Erie canal to be abandoned and superseded by the proposed enlargement.  
 6p. (Sen. doc. 1837, no. 60)
- N. Y. (state)—Attorney-General. Opinion on petition of A. C. Tefft and others for exchange of  
 lands with state. 2p. (Sen. doc. 1844, no. 125)
- N. Y. (state)—Canal board. Report on claim of G. W. Horton for grant or lease of land on  
 the line of the enlarged Erie canal. 1p. (Ass. doc. 1844, no. 68)
- N. Y. (state)—Canal commissioners. Report on petition for exchange of lands at Fort Miller  
 lock. 3p. Sen. doc. 1844, no. 106.  
 1p. Sen. doc. 1844, no. 121.
- N. Y. (state)—Canal board. Resolutions asking Congress for land grants in aid of canal  
 enlargement. 2p. (Sen. doc. 1854, no. 13)
- N. Y. (state)—Canal commissioners. Report on canal lands in village of Geddes. 2p. (Ass.  
 doc. 1855, no. 133)
- An act in relation to abandoned canals, passed Apr. 6, 1857. (see *Laws of New York*)
- N. Y. (state)—Attorney-General. Opinion on constitutionality of bill providing for occupation  
 of canal property for railroad purposes. 2p. (Sen. doc. 1874, no. 85)
- N. Y. (state)—Canal Department, Auditor of. Report on railroad encroachments on canal  
 lands. 2p. (Ass. doc. 1878, no. 96)
- N. Y. (state)—Canal board. Reply concerning encroachments on canal lands by railroads.  
 1p. (Ass. doc. 1883, no. 125)
- N. Y. (state)—Canals, Committee on. Report concerning the encroachments upon canal  
 property by the New York, West Shore and Buffalo railroad. 4p. (Sen. doc. 1883, no. 48)
- N. Y. (state)—Engineer and Surveyor. Report in relation to the canal lands, occupied for  
 railroad purposes. 4p. (Ass. doc. 1883, no. 101)
- N. Y. (state)—Public Works, Superintendent of. Report in reference to occupancy of canal  
 lands for railroad purposes. 80p. (Ass. doc. 1883, no. 106) 385

N. Y. (state)—Public Works, Superintendent of, and Engineer and Surveyor. Report concerning encroachments on canal lands. 34p. (Sen. doc. 1884, no. 47)

Editorial on the granting of a 50-year permit to a subsidiary organisation of the Niagara power company to enter upon all state lands for the distribution of electricity. (*see Eng. mag.* 1894, 7:106) 300 words. 620.5 P1

N. Y. (state)—Public Works, Superintendent of. Report relative to permits granted to occupy canal property for the transmission of light, heat or power. 7p. (Sen. doc. 1901, no. 49)

### CANAL-BOATS.

*See also Annual reports, etc.*

✓ N. Y. (state)—Canal board. Report on petition of Joy, Brace and company and other forwarding merchants, praying for a law limiting the number of packet boats which shall be entitled to a preference over other boats. (*see Ass. jour.* 1828, 51:898)

N. Y. (state)—Select committee. Report on petition of Joy, Brace and company and others, praying for an alteration of the law relative to passage boats. (Ass. doc. 1828, no. 156; or, Ass. jour. 1828, 51:704)

N. Y. (state)—Canal board. Report relative to preference to packet boats in passing locks. 3p. Sen. doc. 1830, no. 98.

4p. Sen. doc. 1830, no. 183.

✓ New line of canal packets. (*see Amer. R. R. jour.* 1835, 4:225) 400 words. 620.5 qJ2

Iron canal-boats. (*see Amer. R. R. jour.* 1840, 10:173; 1843, 16:188, 384) 620.5 J2

One communication signed J. E. B.; the other from the *Albany argus*.

Lists of boats navigating the canals which have elected agreeably to the regulations of the canal board, to commute for the tolls payable according to the established rates upon passengers; and also of the boats which have filed the certificate required, entitling them to make monthly statements of passengers, for years 1842, 1846, 1849, 1851. F. 386

✓ N. Y. (state)—Canal Department, Auditor of. Register of canal-boats showing their names and owners in years 1842, 1845-53. Q. 386 qN421

✓ ——— Register of canal-boats for 1842, 1843, 1845, 1847, 1849, 1851, 1853, 1854. F. 386  
Separate pamphlets.

✓ The canal packets. (*see Amer. R. R. jour.* 1846, 19:268-69) 620.5 qJ2

A new steam canal-boat. (*see Amer. R. R. jour.* 1877, 50:1096) 620.5 qJ2

N. Y. (state)—Engineer and Surveyor. Speed of boats on the Erie canal. (*see Annual report for 1878*, p.64-65) 626 L1

✓ History of canals and canal-boats. p.223-33, Q. (*see U. S.—House—47th Cong. 2d Sess.* Mis. doc. 42, pt.8)  
New York, p.223-30.

N. Y. (state)—Engineer and Surveyor. Steel canal-boats. (*see Annual report for 1895*, p.21-28) 626 L1

Nixon, Lewis. Steel canal-boats. (*see Eng. news*, Nov. 19, 1896, 36:332-33) 2000 words. 620.5 fN4

Condensed from a paper read before the Society of naval architects and marine engineers. Describes the boats and gives midship cross-section drawings. The paper is devoted largely to an argument on the economy of running boats through from lake ports to New York.

Steel canal-boats on the Erie canal. (*see Bradstreet's*, 1896, 24:56) 110 words.

330.5 fB72

Cleveland steel canal-boat company build boats suitable for both lake and canal service.

Noble, Alfred. Speed of ships; report submitted to the board of engineers on deep waterways, 1900, p.216-35, illus. Q. (U. S.—House—56th Cong. 2d Sess. Doc. 149, pt.1, Appendix no. 4)

626.9 qQ0

### CANAL-BOAT TAXATION.

An act "to lay a duty on boats navigating the Champlain or Erie canals, and other purposes," 3p. (Ass. doc. 1824, no. 197)

Canal-boats. (*see Niles' register*, 1824, 27:164-65) 1600 words.

305 qN59

Documents on licensing of boats on New York canals.

N. Y. (state)—Select committee. Report relative to laying a duty on boats carrying passengers and selling spirituous liquors on the canals. (*see Ass. jour.* 1824, 47:10-11)

Resolution relative to the exaction of tonnage duties upon boats navigating the canals of this state. (*see* Sen. jour. 1824, 47:437-38, 541)

Tallmadge, Gen. James. Speech in Assembly, Nov. 8, 1824, in support of his resolution opposing the claim of the United States for tonnage duties on our canal-boats. (*see* Hosack, David. Memoir of DeWitt Clinton. 1829. Appendix, p.401-6) 923.27 qC61

U. S.—Commerce, Committee on. Report, Apr. 21, 1824. (U. S.—House—18th Cong. 1st Sess. Jour. p.439) 72 words.

Also in *Niles register*, v.27, p.165 (305 qN59).  
Inexpedient to so amend act as to exempt boats navigating New York canals from the necessity of being licensed and from payment of tonnage duties.

Tonnage duty on canal-boats. (*see* Alb. daily advertiser, Jan. 15, 1825) 800 words.  
N. Y. state lib.

Examination as to the validity and effect of the project. Editorial.

U. S.—Treasury, Secretary of the. Letter communicating copies of instructions to collectors of the customs in the state of New York relative to the collection of tonnage duties on boats employed in transportation on the canals in that state, May 22, 1826. 20p. (U. S.—Senate—19th Cong. 1st Sess. Doc. 101)

Tax on canal-boats. (*see* Alb. argus and gazette, Feb. 20, 1827) 900 words. 071 xAll  
Correspondence between the Comptroller and certain merchants.

U. S.—Treasury, Secretary of the. Letter in relation to the exemption of boats employed exclusively within the limits of canals from the operation of the law requiring licenses from coasting vessels, Mar. 4, 1844. (U. S.—Senate—28th Cong. 1st Sess. Doc. 183)

N. Y. (state)—Canal board. Resolutions on exemption of canal-boats from operation of coasting laws. 2p. (Sen. doc. 1866, no. 36)

Federal tax on canal-boats. (*see* Buffalo merchants' exchange. Annual report for 1873, p.28-29) 381 B861

From the Auditor's report.

Canal-boats relieved from taxation. (*see* Buffalo board of trade. Statement of trade and commerce for 1874, p.41-42) 381 B86

N. Y. (state)—Attorney-General. Opinion on right of federal government to compel owners of canal-boats to pay fees for license, enrollment papers, etc. 4p. (Ass. doc. 1874, no. 71)

### CANAL SCALES.

N. Y. (state)—Canal commissioners. Report on petition of citizens of Rochester praying for the adoption of a new mode of weighing canal-boats. 4p. (Ass. doc. 1841, no. 272)

N. Y. (state)—Canals, Committee on. Report on petitions praying the adoption of Amsden's plan for weighing boats. 2p. (Ass. doc. 1841, no. 271)

N. Y. (state)—Canal board. Report on Amsden's hydrostatic scale. 32p. illus. O. Rochester, 1849. 626

N. Y. (state)—Canal commissioners. Report on Amsden's hydrostatic scale.

37p. Ass. doc. 1849, no. 225

39p. " 1850, no. 35

N. Y. (state)—Canal board. Report on Amsden's hydrostatic scale. 4p. (Ass. doc. 1866, no. 150)

— Report on methods of weighing boats. 8p. (Ass. doc. 1871, no. 67)

Also in *Proceedings*, 1871, p.87-91.

### CANAL-LOCKS.

*See also* Annual reports, Articles on construction and history of more than one canal, Erie canal, Ship canals, etc.

N. Y. (state)—Canal commissioners. Report on petition of Levi Silliman about his invention called a canal porter, intended as a substitute for locks. (*see* Ass. jour. 1821, 44:842-43)

Laying of foundation stone of locks ascending Mountain ridge, Lockport. (*see* Alb. daily advertiser, July 22, 1823) 800 words. 071

Ceremonies, toasts, etc.

Sullivan, J. L. Explanation of the principles of the perpendicular lift and of the composite lock alluded to in the report of Benjamin Wright and J. L. Sullivan on the Delaware and Hudson canal. (*see their* Report, 1824, p.38-34) 040 P1 v.5

Weighting-locks. (see Niles' register, 1824, 27:370) 200 words.

305 qN59

Brief description of the locks at Utica.

An act to rebuild a lock and waste-weir at Rome, passed Feb. 25, 1828. (see Laws of New York)

N. Y. (state)—Canal commissioners. Report on petition of inhabitants of Chenango Forks, for a lock connecting Chenango river with Chenango canal. 2p. (Ass. doc. 1835, no. 93)

Report on petition of inhabitants of Oxford for lock from river to Chenango canal, with remonstrance. 5p. (Sen. doc. 1835, no. 64)

The mud lock. (see Alb. daily argus, Mar. 9, 1836) 6400 words.

071' xAll

Debate in the Assembly concerning lock enlargement on the Oswego canal.

N. Y. (state)—Canal board. Report in relation to weigh-lock at Oswego. 4p. (Ass. doc. 1837, no. 231)

Report as to changes of locks, etc. on the Genesee Valley canal under act of May 1, 1839. 2p. (Ass. doc. 1840, no. 329)

N. Y. (state)—Canal commissioners. Report relative to improvement of Chemung canal. 21p. (Ass. doc. 1840, no. 161)

Includes report of J. D. Allen relative to the condition of the locks of the canal.

The enlarged canal; new locks. (see Alb. evening jour. Apr. 30, 1842) 300 words.

N. Y. state lib.

From *Lockport courier*. Description of the locks at Lockport.

N. Y. (state)—Canal commissioner. Report on condition of combined locks at Lockport,

5p. Sen. doc. 1843, no. 98

7p. Ass. doc. 1844, no. 131

N. Y. (state)—Canal board. Report on change of plan in construction of locks on Genesee Valley canal. 6p. (Ass. doc. 1845, no. 202)

N. Y. (state)—Canal commissioners. Report on cost of doubling canal-locks from Syracuse to Buffalo. 5p. (Ass. doc. 1846, no. 110)

Report on extra expense of rebuilding canal-lock at Tonawanda, etc. 2p. (Ass. doc. 1846, no. 117)

Report in relation to the length and width of the chamber of the enlarged Erie canal locks, etc. 13p. illus. (Sen. doc. 1849, no. 50)

040 P v.145

Report on the several canals other than the Erie. 13p. (Sen. doc. 1850, no. 83)

Cost of enlarging locks on Oswego, Cayuga and Seneca canals; condition of locks in Champlain canal.

N. Y. (state)—Engineer and Surveyor. Report on lengthening certain locks on Erie canal between Syracuse and Rochester—transmitted by canal board. 8p. (Ass. doc. 1851, no. 67)

Report on locks of Chemung canal. 3p. Sen. doc. 1855, no. 38; 7p. Ass. doc. 1856, no. 113.

N. Y. (state)—Canals, Committee on. Report on locks of Chemung canal. 2p. (Ass. doc. 1856, no. 132)

N. Y. (state)—Canal commissioners. Report on condition of Chemung canal locks. 2p. (Ass. doc. 1857, no. 51)

N. Y. (state)—Canals, Committee on. Minority report on enlargement of locks of Chemung canal. 8p. (Sen. doc. 1857, no. 56)

N. Y. (state)—Engineer and Surveyor. Report of cost of enlarging locks on Chemung canal. 2p. and 4p. (Sen. doc. 1858, nos. 124 and 133)

N. Y. (state)—Canal board. Report on propriety of building locks on Chemung canal of cut stone or composite. 5p. (Sen. doc. 1859, no. 64)

N. Y. (state)—Engineer and Surveyor. Communication relative to enlarging locks on the canals. 3p. (Sen. doc. 1859, no. 28)

N. Y. (state)—Canal board. Report on canal weigh-lock at Buffalo. 2p. (Ass. doc. 1862, no. 92)

N. Y. (state)—Canals, Committee on. Report on bill to rebuild locks at Fort Miller, Moseskill, and Fort Edward. 2p. (Sen. doc. 1862, no. 111)

Report respecting locks on the Oneida Lake canal. 3p. (Sen. doc. 1862, no. 83)

N. Y. (state)—Engineer and Surveyor. Report on enlargement of locks on Champlain canal, to admit gunboats. 8p. map. (Ass. doc. 1862, no. 174)

- Petition to Congress for enlargement of locks of Erie and Oswego canals, May, 1862. 1p. O  
040 P. v.1247
- Proposed enlargement of our canal-locks. (*see* Amer. R. R. jour. 1862, 35:365-66) 1200  
words. 620.5 qJ2
- Military value of enlargement to the general government.
- N. Y. (state)—Canal board. Reply to resolution calling for certain papers concerning canal and locks between West Troy and Albany basin. 2p. (Sen. doc. 1863, no. 112)
- Report on locks of Oneida Lake canal. 4p. (Sen. doc. 1863, no. 118)
- N. Y. (state)—Canal commissioner. Report concerning Champlain canal locks. 2p. (Sen. doc. 1863, no. 116)
- N. Y. (state)—Canals, Committee on. Report, adverse to the Assembly bill entitled "an act to discontinue a lock and bridge on the Chemung canal, in the village of Elmira, and to accept for the state the drawbridge at Gray st. in said village." 3p. (Sen. doc. 1863, no. 123)
- N. Y. (state)—Engineer and Surveyor. Report on enlargement of locks on Erie and Oswego canals. (*see his* Annual report for 1863, p.123-34, 113-203) 626 L1  
Also *Ass. doc.* 1864, no. 179. Gunboat locks.
- New York, Chamber of commerce of. Resolutions on enlargement of canal-locks. 1p. (Sen. doc. 1863, no. 71)
- N. Y. (state)—Canal board. Report on enlargement of locks on Chemung canal. 4p. (Sen. doc. 1864, no. 64)
- Report on Oneida Lake canal locks. 2p. (Sen. doc. 1864, no. 80)
- Report relative to the propriety and necessity of enlarging the locks upon the Erie, Oswego, and Cayuga and Seneca canals. 16p. (*Ass. doc.* 1864, no. 124)
- Summary statements of tolls and tonnage from 1837-62. Considers the necessity of a ship canal from commercial and military standpoints. Estimates of cost of enlargement.
- N. Y. (state)—Canal commissioner. Report relative to the enlargement of certain canal-locks, etc. 10p. (*Ass. doc.* 1864, no. 126)
- Unwise to enter upon any plan of extended improvements while country is engaged in war. Detailed estimates of cost of enlargement appended.
- N. Y. (state)—Canal Department, Auditor of. Report on lock no. 2 in Erie canal and side-cut lock at West Troy. 3p. (Sen. doc. 1864, no. 7)
- Report relative to the Oneida Lake canal locks. 7p. (Sen. doc. 1864, no. 77)
- N. Y. (state)—Engineer and Surveyor. Report on construction of locks, etc., on Erie and Oswego canals. 91p. (*Ass. doc.* 1864, no. 60)
- Prosser, E. S. Enlargement of the locks on the Erie canal; a paper read before the Buffalo historical society, 1863, and published at its request. 9p. O. Buffalo, 1864. 386
- N. Y. (state)—Canal commissioners. Report on progress in construction of lock and dam between mouth of Otter creek and Carthage. 2p. (Sen. doc. 1865, no. 19)
- N. Y. (state)—Canal board. Report on expediency of constructing weigh-lock at Frankfort. 2p. (*Ass. doc.* 1866, no. 103)
- N. Y. (state)—Canal commissioner. Report on locks of Black River canal. 4p. (*Ass. doc.* 1866, no. 42)
- Bennett, D. S. Speech on the enlargement of locks on the Erie and Oswego canals, delivered before the Senate committee on canals, also other important statistics furnished by E. H. Walker. 15p. illus. O. Alb. 1867. 386
- N. Y. (state)—Canal fund, Commissioners of. Report relative to enlarging the locks on the Erie and Oswego canals. 23p. (Sen. doc. 1867, no. 43)
- Constitutional prohibitions and provisions, policy of New York, surplus revenues, demands of commerce; recommendations that enlargement be undertaken by means of surplus revenues.
- N. Y. (state)—Canals, Committee on. Report relative to enlarging the locks on the Erie and Oswego canals. 27p. (*Ass. doc.* 1867, no. 111)
- Favors immediate improvement in order to gain western trade in competition with Canadian routes and with southern route through Ohio river, improvement to be made by means of surplus revenues from canals.
- N. Y. (state)—Engineer and Surveyor. Report on final estimates for rebuilding locks in Genesee Valley canal. 11p. (*Ass. doc.* 1867, no. 172)
- Parsons, Thomas. Speech on the enlargement of the Erie and Oswego canal locks, and the wonderful progress of the western states in population, production and wealth, delivered in the Senate, Mar. 7, 1867. 8p. O. Albany, 1867. 040 P v.2124

N. Y. (state)—Canal commissioner. Report on condition of Fort Miller lock, Champlain canal, and Schoharie creek dam. 8p. (Sen. doc. 1868, no. 32)

N. Y. (state)—Canal board. Report on so enlarging the locks now under contract on the western division of the Erie canal as to permit the passage of boats 200 feet long and 25 feet wide. 8p. (Ass. doc. 1871, no. 47)

Also in *Proceedings*, 1871, p.61-67.

— Resolution asking further appropriation for lock no. 2, Erie canal. 2p. (Ass. doc. 1872, no. 119)

Whitford, Oscar F. Closing breaks in canals under difficulties. (see Amer. soc. civ. eng. Transactions, 1872, 2:161-62) 620.6 N2

Gives details of the closing of a break in the guard-lock of Chenango canal at Binghamton, N. Y.

N. Y. (state)—Engineer and Surveyor. Report relative to locks on the western division of the Erie canal. 8p. with diagram. (Sen. doc. 1875, no. 93)

— Report relative to lengthening Erie canal locks. 5p. (Sen. doc. 1878, no. 37)

N. Y. (state)—Public Works, Superintendent of. Statistics furnished relative to canal weighlocks. 2p. (Ass. doc. 1879, no. 55)

N. Y. (state)—Senate. Resolutions relative to lengthening the locks of the canals. 2p. (Sen. doc. 1887, no. 47)

Dutton, Chauncey N. Pneumatic and hydraulic locks. (see International deep waterways association. Proceedings of annual convention. 1895. 1:222-31) 386 In8

Gives profile of St. Lawrence-Champlain canal route.  
Discussion of paper, p.231-40.

Vertical lift-lock for the Erie canal at Lockport. (see Eng. news, 1895, 33:252-53, 257-59)

620.5 fN4

Full illustrated description and considerations in favor of lift-locks, with editorial comment.

Deepening a canal-lock. (see Eng. rec. Apr. 10, 1897, 35:404) 600 words. 620.5 fN7

Illustrated description of special methods adopted in the modification of the existing locks of the Erie canal so that they will conform to the increased draft of water secured in other parts of the canal.

New York state canals improvement; deepening the canal prism. (see Eng. news, 1897, 38:187-99) 620.5 fN4

Illustrated description of lining and puddling, lift-locks and waste-weirs.

Symons, Thomas W. Report upon House bill 7775, 54th congress, 1st session, providing for widening the locks of the Erie canal. (see U. S.—Engineer department. Annual report for 1897, Appendix MM 10, p. 3250-65) 626.9 P7

U. S.—House—55th Cong. 2d Sess. Doc. 2, pt.4.

— Reports relating to the widening of the locks of the Erie and Oswego canals in the state of New York, transmitted by the secretary of war, Jan. 4, 1897. 17p. illus. O. (U. S.—House—54th Cong. 2d Sess. Doc. 231)

Accompanied with a profile and cross-sections of the Erie canal showing the proposed enlargement of locks.

Lock reconstruction on the Oswego canal. (see Eng. rec. 1898, 38:70-71) 1100 words.

620.5 fN7

Illustrated description of large concrete locks with limestone facing.

Lift-lock for Erie canal, at Cohoes. (see Eng. news, 1899, 41:293) 400 words. 620.5 fN4  
May be built by private company.

Different high-lift locks as presented and considered at a meeting of the board of consulting engineers, July 2-3, 1900. (see Eng. news, 1900, 44:17) 680 words. 620.5 fN4

Dutton, Chauncey N. The Dutton pneumatic balance locks for canals. (see Jour. Franklin inst. Apr. 1900, 149:241-47) 8500 words. 605' I6

Illustrated description of the characteristic features of these locks and their operation. An address.

High-lift locks for the Erie canal. (see Sci. Amer. 1900, 83:114) 605 fK5

Noble, Alfred. Locks; report submitted to the board of engineers on deep waterways, 1900. p.129-48, illus. Q. (U. S.—House—56th Cong. 2d Sess. Doc. 149, pt.1, Appendix no. 1.) 626.9 qQ0

Proposed pneumatic balance locks for the Erie canal. (see Sci. Amer. Feb. 3, 1900, 82:74) 1700 words. 605 fK5

Illustrated description of the Dutton pneumatic locks.

Spalding, Henry Curtis. Views on construction of 11 ft. canal and the combination of neighboring locks into single large lifts; reply to the Circular letter of May 1. (*see* N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence. 1900. p.238-43) 386 N4269  
*See* Ass. doc. 1900, no. 79.

Woodard, S. H. Lock-gates; report submitted to the board of engineers on deep waterways, 1900. p.148-207, illus. Q. (U. S.—House—56th Cong. 2d Sess. Doc. 149, pt.1, Appendix no. 2) 626.9 qQ0

## MEANS OF PROPULSION ON CANALS.

## Steam.

Laws respecting steamboats passed 1797, 1798, 1799, 1803, 1807, 1808, 1811. (*see* Livingston, J: R. and R: J. Petition to the Legislature of New Jersey respecting steamboats. 1814. p.16-29) 040 P1 v.9

Duer, William Alexander. Letter addressed to C. D. Colden in answer to the strictures contained in his "Life of Robert Fulton" upon the report of the select committee to whom was referred a memorial relative to steam navigation, presented to the Legislature of New York, 1814. 127p. O. Alb. 1817. 387 D86  
 Review of above letter, 27p. O. N. Y. 1818 (387).

Colden, Cadwallader David. Steam navigation in New York, also early canal plans. (*see* his Life of Robert Fulton, 1817, p.167-95, 201-5 and 236-51) 926.2 F951

—— Vindication of the steamboat right granted by the state of New York; an answer to the letter of Mr. Duer. 178p. O. Alb. 1818. 387 D86

Sullivan, John L. Demonstration of the right to the navigation of the waters of New York without the license of the owners of the monopoly of steam and fire granted to Robert Livingston and Robert Fulton, comprehending the opinions of judges and counsel on the case. 41p. O. Cambridge, Mass. 1821. N. Y. state law lib.

Canal steamboat, between Utica and Rochester, June 9, 1824. (*see* Niles' register, 1824, 26:268) 100 words. 305 qN59

N. Y. (state)—Attorney-General. Report relative to steamboats navigating the Hudson river. 3p. (Ass. doc. 1824, no. 202)

Steam towboats. (*see* Alb. daily advertiser, Jan. 20, 1825) 800 words. N. Y. state lib.  
 Signed "Eboracus." Consideration of the practicability of the proposition.

N. Y. (state)—Select committee. Report on petition of A. Planton concerning his "new mode of constructing and propelling steam-boats on rivers, canals and shallow streams." 2p. (Ass. doc. 1835, no. 385)

—— Report on petition of Susquehannah steam navigation company for franchise to navigate the river with steamboats. 2p. (Ass. doc. 1835, no. 339)

First steamboat on Oneida lake. (*see* Amer. R. R. jour. 1836, 5:474) 100 words. 620.5 qJ2

N. Y. (state)—Canal commissioners. Report on petition of A. Planton for appropriation for construction of a steam canal-boat. 2p. (Ass. doc. 1837, no. 100)

N. Y. (state)—Select committee. Report on petitions of inhabitants of Onondaga, Oneida and Oswego counties in relation to navigation of Oneida lake and river by steam-power. 2p. (Ass. doc. 1838, no. 202)

Canal steamboat; a new and important invention. Editorial. (*see* Alb. daily argus, Sept. 2, 1840) 300 words. 071 xAll

Steam on the canals. (*see* Hazard's U. S. commercial and statistical register, 1840, 3:176) 50 words. 305 qH33

From *New York sun*.

Reigart, J. Franklin. New York canals, with references to steam navigation on the Hudson, and a letter from Robert Fulton to Gouverneur Morris, dated 1814. (*see* his Life of Robert Fulton, 1856, p.102-4, 169-80, 289-97) 926.2 F952

Conklin, F. A. Steam on the canals. (*see* Amer. R. R. jour. 1858, 31:737-38) 2800 words. 620.5 qJ2

Address before the Chamber of Commerce, Nov. 18, 1858, dealing with different problems of Erie canal.

Detailed account of the first three steamers through from Buffalo to New York each with barge in tow. (*see* Amer. R. R. jour. 1858, 31:779-80) 1300 words. 620.5 qJ2

From *New York times*



- Henry, Edwin. Steam on canal and river; Archimedean propeller co., Montgomery's patent screw and boiler. 17p. O. N. Y. 1858. 040 P v.477
- Steam on canals. (see Amer. R. R. jour. 1858, 31:771) 100 words. 620.5 qJ2
- Expenditures of steamboat, Fulton, on trips from Buffalo to Rochester.
- Steam on the Erie canal. (see Amer. R. R. jour. 1858, 31:507-, 600, 677) 800 words. 620.5 qJ2
- Extracts from recent speech at Buffalo by S. B. Ruggles; experiment of Charles Mack, propeller; stipulation from Mr. Blanchard permitting the use on the canals of his invention for saving fuel in steam boilers.
- Steam on canals. (see Amer. R. R. jour. 1863, 36:494) 60 words. 620.5 qJ2
- Experiments on Erie canal unsatisfactory.
- An act to provide for the introduction of an improved system of steam towage upon the canals of the state, passed May 5, 1870. (see Laws of New York)
- An act, passed May 10, 1871, to amend an act entitled "an act to provide for the introduction of an improved system of steam towage upon the canals of this state," passed May 5, 1870. (see Laws of New York)
- Perrin, E. O. Plea for the state canals and for the introduction of steam towage thereon. 32p. O. Alb. 1870. 040 P v.1947 or 2438
- Favors the "Harvey plan."
- An act to foster and develop the internal commerce of the state by inviting and rewarding the practical and profitable introduction upon the canals, of steam, caloric, electricity or any motor other than animal power for the propulsion of boats, passed Apr. 28, 1871. (see Laws of New York)
- Farwell, Addison M. Communication concerning an improved system of canal towage by use of submerged cables. 3p. (Sen. doc. 1871, no. 9)
- N. Y. (state)—Canal Department, Auditor of. Report on rules and regulations in regard to navigation of the canals by boats propelled by steam. (see N. Y. (state)—Canal board. Proceedings, 1871, p.42-44) 386 N4264
- N. Y. (state)—Governor. Message. (see Ass. jour. 1871, 94:20)
- Recommends an appropriation for testing the merits of several projected methods of propelling canal-boats by steam.
- New York, Chamber of commerce of. Report of committee on subject of navigating the canals by steam and the examination of the steamer "George Barnard." (see Annual report, 1871, 13:86-88) 381 N42
- Recommends resolution for legislative protection and encouragement in the application of steam to canal navigation.
- Steam on the canals. (see Amer. R. R. jour.) 620.5 qJ2
- 1871 44:983, 986, 1238.
- 1872 45:108, 234, 996, 1325, 1477, 1517, 1548.
- 1873 46:1180, 1334, 1337, 1423, 1447, 1455.
- 1874 47:263, 993-94, 1116.
- 1875 48:261, 637.
- Plans submitted in the competition for the \$100,000 prize offered by the state of New York for the best motor for canal navigation, and results.
- Steam-power for the canals. Editorial. (see Commer. and finan. chron. 1871, 12:391-92) 1300 words. 332 qC73
- An act to encourage steam towage upon the canals of this state, passed, May 6, 1872. (see Laws of New York)
- N. Y. (state)—Steam on canals, Commission on. Report. 20p. (Ass. doc. 1872, no. 61) 626.8
- New York produce exchange. Steam as a motor for moving boats on the canals. (see Annual report, 1872-73, p.292-303) 381 N423
- Steam canal-boats, William Newman and William Baxter. Belgian system of towage by cable, p.295-303.
- New York steam cable towing company. Prospectus; New York canals, their commercial importance. 46p. O. Alb. 1872. 386
- Steam on the canals. (see Buffalo board of trade. Statement of trade and commerce) 381 B86
- 1872 p.94-96; 1874 p.138-39; 1873 p.109-10.
- Steam-power on the canals. Editorial. (see Commer and finan. chron, 1872, 15:345) 300 words. 332 qC73

- Dobbins, D. P. Prospectus for the organization of an incorporated company for carrying on the business of transportation between Buffalo and New York; which is to be known as the Dobbins steam transit company. 3p. Q. Buffalo, n.d. 386
- Report of the trial trips made by the steam canal-boat "William Newman" of Buffalo, through the Erie canal during the seasons of 1872 and 1873. 15p. O. Buffalo, 1873. 040 P v.2124
- Steam on the canals in 1872 and 1873. 6p. O. Buffalo, 1873. 040 P v.2124
- N. Y. (state)—Commission. Steam on the canals; second annual report. 164p. (Sen. doc. 1873, no. 71) 040 P v.2124
- N. Y. (state)—Governor. Message. (*see* Ass. jour. 1873, 96:18)
- Advantages of steam-power.
- Baxter, William. Steam on canals; address before the American institute, Apr. 16, 1874. 16p. O. n.p. n.d. 040 P v.2124
- Greene, D. M. Report of the engineer upon the Belgian system of steam towing, between Lockport and Buffalo. (Ass. doc. 1874, no. 65, Appendix p.77-85)
- Steam on the Erie canal, 1874. (*see* U. S.—Senate—43d Cong. 1st Sess. Rep. 307, pt.1, Appendix p.152-53)
- N. Y. (state)—Commission. Steam on the canals; third annual report, transmitted Feb. 20, 1874. 89p. (Ass. doc. 1874, no. 65) 040 P v.2124
- N. Y. (state)—Engineer and Surveyor. Steam on the canals. (*see* Annual report for 1874, p.27-53)
- Ass. doc. 1875, no. 80.
- Baxter, William. Communication to S. B. Ruggles, chairman, Joint committee of conference on commercial facilities, Jan. 1875, 16p. O. N. Y. 1875. 386
- "Baxter steam canal system" on Erie canal.
- N. Y. (state)—Engineer and Surveyor. Statement as to progress made in introduction of steam canal-boats. 9p. (Ass. doc. 1875, no. 62)
- N. Y. (state)—Governor. Messages. (*see* Ass. jour. 1875, 98:28)
- "Improvement of waterway will facilitate the use of steam canal-boats."
- An act to encourage improvement in steam canal propulsion in this state, passed May 23, 1876. (*see* Laws of New York)
- Frick, William. Steam train boats for canal transportation. 7p. O. Phil. 1876. 040 P v.2124
- An act to provide for the introduction of an improved system of steam towage upon the canals of the state, passed June 1, 1877. (*see* Laws of New York)
- Single rail system of steam towage.
- Canal propulsion. (*see* Amer. R. R. jour. 1877, 50:100) 300 words. 620.5 qJ2
- Description of a model of a canal-boat fitted up with a motor, styled "direct propulsion."
- N. Y. (state)—Engineer and Surveyor. Cable towing. (*see* Annual report for 1877, p.47-58)
- Ass. doc. 1878, no. 9.
- New York steam cable towing company. Low tolls and steam on the Erie canal; the Belgian system of steam cable towage. 15p. O. N. Y. 1877. 386
- Extract from report of Auditor of Canal Department, 1876, p.7-10. Also in Report of committee of Chamber of commerce of the state of New York, p.13-15.
- Richmond, Alonzo. Comparative cost of steam and animal transit on the canal. (*see his* Tolls and transportation. 1877. p.14-18) 386
- An act authorising D. W. Cooke and his associates to improve the navigation of this state passed June 20, 1879. (*see* Laws of New York)
- N. Y. (state)—Canals, Assembly committee on. Evidence and arguments given before the committee, Mar. 19, 20 and 25, 1879, favoring the introduction of an improved system of towage. O. n.p. n.d. N. Y. state law lib. pamphlet, v.202
- N. Y. (state)—Engineer and Surveyor. Trip of the steamer Emma and consort Hathaway, from Buffalo to New York, July 11-20, 1879. (*see* Annual report for 1879, p.22-32) 626 L1
- Illinois system.
- Tremain, H. E. Argument before the Assembly canal committee Mar. 25, 1879, favoring an improved system of towage by a railway. O. Astor library catalogue

- Geddes, George. Views in regard to use of steam power for moving boats on our canals. (*see* N. Y. (state)—Engineer and Surveyor. Annual report for 1890, p.10-13) 626 L1
- Steam on the canals. (*see* Amer. R. R. jour. 1890, 53:1060) 620.5 qJ2
- From *Buffalo commercial advertiser*.  
Argument in favor of improved methods of propulsion.
- Canal management and results. (*see* Commer. and finan. chron. 1881, 32:138-39) 2000 words. 332 qC73
- Editorial on Belgian towing system, etc.
- Knox, Thomas Wallace. New York canals and steam navigation on the Hudson. (*see* *his* Life of Robert Fulton and history of steam navigation. 1887. p.28-30, 100-42) 926.2 F95
- Goodwin, John M. Driven-cable towing for the Erie canal. 60p. illus. Q. n.p. 1889. 386
- Jeans, James Stephen. Brief description of Erie canal and act of Legislature encouraging improved methods for propulsion of canal-boats. (*see* *his* Waterways and water transport in different countries. 1890. p.194-95, 202, 215, 465-66) 386 J34
- N. Y. (state)—Engineer and Surveyor. Extracts from report of observations on transportation upon the New York state canals, the Hudson river and other connecting waterways, with notes upon transportation on the Illinois and Michigan canal and upon canal-boat towage on the Ohio and Mississippi rivers. (*see* Annual report for 1891, p.48-49; Appendix E, p.403-95) 626 L1
- Steam on the canals, 1871-91, p.405-34; the "Belgian system," p.457-60; Champlain canal, p.460-64; towing on Hudson river, p.468-74.
- Steam on the canals. (*see* Eng. mag. 1894, 6:720) 200 words. 620.5 P1
- Table of cost of steam-power, by C. E. Emory, from *Transactions of American institute of electrical engineers*, March 1893. (*see* Ass. doc. 1896, no. 62)
- Table 14 of Annual report of State Engineer and Surveyor for 1895.
- Symons, Thomas W. Steam propulsion on the Erie canal. (*see* U. S.—Engineer department. Annual report for 1897, p.3204-7) 626.9 P7

### Electricity.

- N. Y. (state)—Engineer and Surveyor. Electricity as a canal motive power. (*see* Annual report for 1892, p.23-24) 626 L1
- Suggests enacting into law some scheme for encouragement of electrical investigations and inventors.
- An act concerning experimental work in the use of electricity as a motive power. (*see* Laws of 1893)
- Barnes, C. R. Electrical canal propulsion. (*see* N. Y. (state)—Public Works, Superintendent of. Annual report on canals for 1893, p.30-35; 1895, p.29-35) 2200 words. 386 N425
- Also in *Western electrician*, Jan. 18, 1896.
- Electric motors for canal-boat propulsion. (*see* Eng. news, 1893, 30:435-36) 2000 words. 620.5 fN4
- An editorial describing the results of recent experiments at Rochester, N. Y.
- Electrical propulsion on the Erie canal. (*see* Elect. eng. Nov. 22, 1893, 16:447-49) 621.3 qO2
- Brief description of the first official test of the boat, Frank W. Hawley.
- Electricity for canal-boat propulsion. (*see* Elect. engr. 1893, 15:607) 175 words. 621.3 qO2
- On patent issued to S. W. Gear, Buffalo.
- Electricity on the canals. (*see* Bradstreet's, 1893, 21:745) 400 words. 330.5 fB72
- (*see* Elect. world, 1893, 22:413) 900 words. 621.3 fN4
- Report of trial of trolley system at Rochester.
- Emancipating the canal mule. (*see* Elect. engr. 1893, 15:35) 175 words. 621.3 qO2
- Editorial on message of Gov. Flower.
- Illustrated editorial on preliminary arrangements for test near Rochester. (*see* Cassier's mag. 1893, 5:153) 150 words. 620.5 qP1
- N. Y. (state)—Engineer and Surveyor. Electricity as a motive power. (*see* Annual report for 1893, p.26-29) 626 L1
- Use of storage battery and trolley systems.
- N. Y. (state)—Governor. Message. (*see* Ass. jour. 1893, 116:20-21)
- Recommends encouragement of experiments in the use of electricity on the canals.
- The trolley on the Erie canal. (*see* Eng. news, 1893, 29:52, 570; 30:145, 405) 620.5 fN4

An act relative to use of electricity on the canals, passed Apr. 20, 1894. (*see* Laws of New York)

Canal boats and electricity. (*see* Bradstreet's, 1894, 22:174-75) 500 words. 330.5 fB72  
Dispatch about a 50-year permit to Cataract general electric company.

Cataract electric company is given the award by the state of New York for supplying electric locomotion to canal-boats. (*see* The engineer, Apr. 13, 1894, 77:307) 100 words.

620.5 fL6

Cazin, F. M. F. The electric canal-tugboat. (*see* Elect. world, 1894, 24:344-46) 4000 words. 621.3 fN4

Illustrated technical review of subject.

Editorials on the parts dealing with electrical canal-boat propulsion, of the reports of the Governor, the State Engineer and the Superintendent of Public Works. (*see* Eng. mag. 1894, 6:718-20) 1000 words. 620.5 P1

Electric power on the Erie canal. (*see* Bradstreet's, 1894, 22:222-23) 450 words.

330.5 fB72

From *Engineering record*. Canal needs enlargement as well as electric power equipment.

Electrical canal towing. (*see* Elect. world, 1894, 23:471) 1000 words. 621.3 fN4  
Illustrated description of T. D. Davis' system.

Electricity on the canals. (*see* Elect. world, 1894, 23:75) 300 words. 621.3 fN4

Editorial on the report of recent trial of trolley electrical canal propulsion.

— (*see* Elect. world, 1894, 23:392) 500 words.

621.5 fN4

"Cataract general electric company" is organized to construct a system of electrical canal-boat propulsion.

First experimental trial in this country of electrical canal-boat propulsion. (*see* Eng. mag. Jan. 1894, 6:527-28) 250 words. 620.5 P1

Hassan, M. W. Electricity on the canals. (*see* Elect. world, 1894, 24:4) 400 words.

621.3 fN4

Illustrated description of a system of electrical canal-boat propulsion.

Lamb, Richard. Steam and electric cable-ways for logging and canal-boat towing. (*see* Elect. engr. 1894, 18:33-34) 900 words. 621.3 qO2

Abstract of paper read before the American Society of civil engineers, 1904. Illustrations and additional details, p.52-53.

N. Y. (state)—Engineer and Surveyor. Electricity on the canals. (*see* his Annual report for 1894, p.30-41) 626 L1

Ass. doc. 1895, no. 89.

Account of the T. F. Milligan electric system for canal-boat propulsion, p.33-41.

N. Y. (state)—Governor. Message. (*Ass. jour.* 1894, 117:21-24)

Electric motive power advantages.

Sachs, Joseph. Electrical canal-boat propulsion. (*see* Cassier's mag. 1894, 5:500-2) 2100 words. 620.5 qP1

Comparison of six methods of propelling boats.

The trolley on the canal. (*see* St. railway rev. 1894, 4:33) 500 words. 388 qSt81

Editorial on official reports to the Legislature.

Brief outline of plan of the cataract general electric company for towing boats on the Erie canal by electric power. (*see* Eng. news, 1895, 33:297) 620.5 fN4

Canal-boat towing test on the Erie canal. (*see* St. railway rev. 1895, 5:665-66) 1200 words.

388 qSt81

Illustrated description of the Lamb system tested at Tonawanda. By the side of the tow-path are two cables; the upper 1½-inch cable is 16 feet from the ground and supports the motor, the smaller ½-inch cable is wound around the hauling drum of the motor and carries the return current.

Canal-boat traction. (*see* Elect. world, 1895, 25:388) 200 words. 621.3 fN4

Illustrated description of Lamb system of electric towage.

Canal improvements and the Lamb motor on the Erie canal. (*see* Elec. engr. Nov. 20, 1895, 20:501) 1000 words. 621.3 qO2

An illustrated description of this electric motor and its operation.

Cawley system of canal haulage. Illustrated. (*see* St. railway rev. 1895, 5:722) 140 words.

388 qSt81

Coerper, Carl. Electric lighting of the canal. (*see* Elect. world, 1895, 25:709-11) 4000 words. 621.3 fN4

Illustrated scientific description.

- Electric canal towing. (*see* Bradstreet's, 1895, 23:701) 425 words. 330.5 fB72  
 Extracts from the *Globe-democrat* and *Philadelphia press*.  
 Lamb system experiment at Tonawanda.
- Electric propulsion on Erie canal, by use of two cables, suggested by Cataract general electric company. (*see* Eng. news, 1895, 33:297) 150 words. 620.5 fN4
- Electricity on the canals. (*see* Elect. world, 1895, 26:488) 1500 words. 621.3 fN4  
 Illustrated description of towage, lumber haulage, etc.
- Electricity on the Erie canal. (*see* Elect. eng. Oct. 30 and Nov. 6, 1895, 20:417-21 and 455) 3200 and 550 words. 621.3 qO2  
 Illustrated descriptive articles on the Lamb system experiments.
- Lamb electric cable way for canal-boat haulage. (*see* Elect. engr. 1895, 19:245-46) 1000 words. 621.3 qO2  
 Experiment at Trenton, N. J.
- N. Y. (state)—Engineer and Surveyor. Towing by electricity. (*see* Annual report for 1895, p.209-45) 626 L1  
 Lamb electric towing system, by C. R. Barnes, p.214-20, followed by report of tests; removable and vertically adjustable electrical propelling apparatus for canal-boats, invented by C. S. Dutton, p.237-41; Beyer's propelling apparatus for vessels, by Louis Beyer, p.241-45.
- Niagara power on the Erie canal. (*see* Elec. engr. 1895, 20:340 and 341) 150 words. 621.3 qO2  
 W: B. Rankine denies any interest of the Cataract construction company, or its ally, the Niagara Falls power company, in Frank W. Hawley's scheme of canal-boat propulsion.
- Test of electricity on the Erie canal. (*see* Bradstreet's, 1895, 23:541) 300 words. 330.5 fB72  
 From *Railway review*. Lamb system.
- Electric traction on the Erie canal. (*see* Elect. engr. 1896, 21:95) 370 words. 621.3 qO2
- Editorial on report of state electrician, C. R. Barnes, on the Lamb towing system.
- Electricity for New York canals. (*see* Elect. engr. 1896, 21:226) 35 words. 621.3 qO2
- Notice of bill to expend \$500,000 for equipment of state canals with electrical power.
- Erie canal. (*see* The engineer, 1896, 81:155) 150 words. 620.5 fL6  
 Against renewal of rights to mill owners to use surplus waters; for a direct towing electric motor running on a track on the tow-path.
- Erie canal traction. (*see* Bradstreet's, 1896, 24:648) 100 words. 330.5 fB72  
 Report of sale to an English syndicate; validity of Cataract general electric company's franchise questioned.
- Martin, Thomas Commerford. Utilization of the Niagara. (*see* Smithsonian institution. Annual report, 1896, p.230-31) 250 words. 506 K7a  
 Electric haulage on Erie canal.
- N. Y. (state)—Governor. Message. (*Ass. jour.* 1896, 119:25)  
 Result of experiments in use of electric motive power.
- Electric traction system on the principle of the rack railroad, proposed by Judge A. E. Schats of New York. (*see* Cassier's mag. 1897, 12:641) 300 words. 620.5 qP1
- Allen, A. H. Electric canal haulage. (*see* Elect. engr. Oct. 27, 1898, 26:412-13) 1500 words. 621.3 qO2  
 System invented by Messrs. Thwaite and Cawley.
- Croil, James. The Erie canal. (*see* his Steam navigation, 1898, p.290-83) 650 words. 387 C87
- Electric canal towage. (*see* Elect. world, 1898, 32:386) 500 words. 621.3 fN4  
 Editorial on its desirability.
- Walker plan for electrical operation of Erie canal. Illustrated. (*see* Elect. engr. 1898, 25:350) 200 words. 621.3 qO2
- Hall, Gordon W. Outline of plan for electric propulsion on canals. (*see* N. Y. (state)—Canals, Committee on, 1899. Minutes and correspondence, 1900. p.175-76) 386 N4269  
 In *Ass. doc.* 1900, no 79.
- Development of electric traction on canal. Illustrated. (*see* Elect. world, Feb. 2, 1901, 37:181, 187-90) 2800 words. 621.3 fN4  
 Experiments upon the Erie and other canals, summary of work to date in this country.
- Electric railway vs. canal. (*see* St. railway rev. 1901, 11:116) 100 words. 388 q8t81

- Electric canal propulsion. (*see* St. railway rev. 1903, 13:135-36) 800 words. 388 q8t81  
Sketch of different attempts on various canals.
- "Electric mule" on Erie canal. (*see* St. railway jour. 1903, 22:891-92) 700 words. 388 q8t8
- Illustrated article on recent tests of Wood towing system at Schenectady.
- Electric towing on the Erie canal. (*see* Elect. world, Nov. 1903, 42:769, 795-96) 1500 words. 621.3 fN4
- Illustrated description of the Stephen W. Wood system operated at Schenectady.
- Electric traction on canals. (*see* Eng. rec. Nov. 14, 1903, 48:596-98) 2000 words. 620.7 fN7
- Reviews the various systems that have been tried, giving information in regard to the recent trials of the Wood system at Schenectady, and the system in operation on the Miami and Erie canal.
- N. Y. (state)—Public Works, Superintendent of. Electrical canal propulsion. (*see* his Annual report on canals for 1903, p.27-30) 386 N425
- Wood system of towing.
- Walsh, George E. Recent canal haulage improvements. (*see* Iron age, Oct. 29, 1903) 1800 words. 671 qL5
- Considers recent electric haulage systems, and the general tendency.
- An electric canal towage system. (*see* The engineer, Jan. 8, 1904, 97:45) 350 words. 620.5 fL6
- Invention of S. W. Wood, introduced by the International towing and power company.
- Equipping the Erie canal electrically. (*see* Elect. world, 1904, 43:208) 350 words. 621.3 fN4
- Can the Superintendent of Public Works grant an indeterminate right to install an electric towage plant on the canals?
- Report on electrical canal haulage. (*see* Elect. world, 1905, 45:1070) 175 words. 621.3 fN4
- Report of Senator M. E. Lewis, chairman of commission, on the Wood system experiment, July 20, 1904.
- Where the state can save. (*see* New York sun, Jan. 7, 1905) 1200 words.
- "Problems stated by Governor Higgins answered by revelations concerning electrical towing on the present canal."

## PROPOSED CANALS.

## Long Island canal.

*See also* Shinnecock and Peconic canal.

N. Y. (state)—Select committee. Report relative to a bill, entitled "an act to incorporate the Long Island canal company." (Sen. jour. 1825, 48:554-55)

N. Y. (state)—Canals, Committee on. Report relative to the Long Island canal company. (*see* Sen. jour. 1826, 49:379)

Bill entitled "an act to incorporate the Long Island canal company." 6p. (Sen. doc. Jan. 6, 1827)

N. Y. (state)—Select committee. Report in reference to the incorporation of the Long Island canal company. (Sen. jour. 1827, 1st sess. 50:33-34)

An act to incorporate the Long Island canal company. 3p. (Ass. doc. 1828, no. 107)  
Also in *Laws of New York*.

An act, passed Apr. 24, 1829, to amend an act entitled "an act to incorporate the Long Island canal company," passed Apr. 15, 1828. (*see* Laws of New York)

N. Y. (state)—Banks and insurance companies, Committee on. Report on petition of Long Island canal company for annexation of banking powers to their charter. 3p. (Sen. doc. 1831, no. 66)

An act to incorporate the Long Island canal and navigation company, passed Apr. 8, 1848. (*see* Laws of New York)

## Niagara canal.

*See also* Ship canals.

An act for opening the navigation between Lake Erie and Lake Ontario, passed Apr. 5, 1798. (*see* Laws of New York)

Penfield, Daniel. Letter to Samuel Osgood, dated N. Y. Jan. 19, 1808, on Niagara canal. (*see* Amer. state papers. Miscellaneous, 1:789) N. Y. state law lib.

An act to incorporate the Niagara canal company, passed Apr. 11, 1823. (*see Laws of New York*)

N. Y. (state)—Select committee. Report on petition of Benjamin Barton and others, praying for an act of incorporation to enable them to construct a navigable canal around the Falls of Niagara. (Sen. doc. 1823, no. 126; or Sen. jour. 1823, 46:143-44)

An act to authorise the construction of a canal on the margin of the Niagara river near the Black Rock basin. 1p. (Ass. doc. 1825, no. 76)

N. Y. (state)—Canals, Joint committee on. Report on petition of Willard Walker and company and others praying for the construction of a canal along the margin of the Niagara river. 2p. (Ass. doc. 1825, no. 75)

Niagara canal. (*see Niles' register*, 1825, 29:114,215) 360 words. 305 qN50

An act in addition to an act, entitled "an act to incorporate the Niagara canal company. 1p. (Ass. doc. 1826, no. 245)

N. Y. (state)—Canal commissioners. Report on petitions from inhabitants of Niagara and Erie counties, praying that the Niagara canal company may be permitted to increase its capital stock. (*see Ass. jour.* 1826, 49:974)

New York, Chamber of Commerce of. Report upon the letter of "the corresponding committee of the citizens of the county of Oswego," June 2, 1834. (*see Niles' register*, 1834, 47:25-26) 1100 words. 305 qN50

Canal around the Niagara Falls.

Oswego county citizens. Canal round the Falls of Niagara; circular, Nov. 6, 1835. (*see Amer. R. R. jour.* 1835, 4:725-26) 1200 words. 620.5 qJ2

Preceded by an editorial from the *New York American*.

N. Y. (state)—Canals, Committee on. Adverse report concerning the mill-race at Niagara Falls. 3p. (Ass. doc. 1850, no. 157)

Another canal at Niagara. (*see The engineer*, Aug. 19, 1904, 98:185) 350 words.

620.5 fL6

Franchise under which company proposes to operate is that granted to develop Love's Model city project.

#### Orange and Sussex canal.

An act to incorporate the Orange and Sussex canal company, passed Apr. 9, 1824. (*see Laws of New York*)

Also *Ass. doc.* 1824, no. 151.

An act passed Apr. 11, 1826, supplementary to the act entitled "an act to incorporate the Orange and Sussex canal company," passed Apr. 9, 1824. (*see Laws of New York*)

Also *Ass. doc.* 1826, no. 165.

An act passed Apr. 5, 1828, amending the act, entitled "an act to incorporate the Orange and Sussex canal company, passed Apr. 9, 1824, and the act supplementary thereto, passed Apr. 11, 1826. (*see Laws of New York*)

#### St. Lawrence and Lake Champlain canal.

Canal uniting lakes Ontario and Champlain. (*see Alb. daily advertiser*, Nov. 21, 1822) 700 words. N. Y. state lib.

From *Ogdensburgh gazette*. Editorial review.

Project of canal from Lake Ontario to Lake Champlain, circular letter addressed by B. Raymond. Editorial. (*see Niles' register*, Nov. 23, 1822, 23:178) 150 words. 305 qN50

Projected canal to connect lakes Ontario and Champlain. (*see Alb. daily advertiser*, Nov. 15, 1822) 1300 words. N. Y. state lib.

From *Franklin county telegraph*. Circular addressed to land owners along its route, advising donations of land.

Waterhouse, H. S. Inland navigation; canal connecting the St. Lawrence and Lake Champlain. (*see Alb. daily advertiser*, Dec. 13, 1822) 1000 words. N. Y. state lib.

From *Franklin county telegraph*. Desirability of the canal.

Canal between lakes Ontario and Champlain. (*see Alb. daily advertiser*, Jan. 23, 1823) 350 words. N. Y. state lib.

Report of meeting of citizens of Malone.

Canal meeting. (*see Alb. daily advertiser*, Feb. 11, 1823) 3000 words. N. Y. State lib.  
From *Ogdensburgh gazette*. Report of meeting relative to canal between lakes Ontario and Champlain.

N. Y. (state)—Canals, Committee on. Report on petition for a survey and estimates for a canal between Lake Ontario and Lake Champlain. (Ass. jour. 1823, 46:585-86; also Ass. doc. 1823, no. 126)

Ontario and Champlain canal, Committee on. Report. 6p. O. Potsdam, N. Y. 1823.  
040 P1 v.5

Petition of inhabitants of the northerly part of the state, praying for aid, to make a canal from Lake Ontario near Ogdensburgh to Lake Champlain, near Plattsburg. 3p. (Ass. doc. 1823, no. 68)

An act authorising the survey of a route of a canal from the River St. Lawrence to Lake Champlain, passed Apr. 10, 1824. (see Laws of New York)  
Also Ass. doc. 1824, no. 157.

N. Y. (state)—Canals, Committee on. Report on the memorial for surveying a canal from Ogdensburgh to Lake Champlain. 5p. (Ass. doc. 1824, no. 156; or. Ass. jour. 1824, 47:804-8)

Ontario and Champlain canal. (see Alb. daily advertiser, Mar. 5, 1824) 1600 words.  
N. Y. state lib.

Desirability of the proposed canal.

Raymond, B. and others. Memorial of the counties of St. Lawrence, Franklin and Clinton to the Legislature of New York, praying for an act authorising a survey of the route of a canal to connect Lakes Ontario and Champlain, commencing at the foot of sloop navigation of the St. Lawrence, presented Jan. 23, 1824. 45p. O. 040 P v145  
Followed by a memorial from the city of New York and the abstract of the debate in the Assembly on the bill authorizing the survey.

St. Lawrence and Champlain canal. (see Alb. daily advertiser, Apr. 6 and 7, 1824) 1700 and 1900 words.  
N. Y. state lib.  
Extract of debate in Assembly on bill making appropriation for survey of route.

Hutchinson, Holmes. Documents relative to the survey and examination of the route of a proposed canal from Ogdensburgh to Lake Champlain. 34p. F. (see Ass. jour. 1825, v.48, Appendix G)  
Topographical description and estimated cost of construction of each mile of proposed canal.

N. Y. (state)—Canal commissioners. Communication on the survey of a route for a canal from the St. Lawrence river to Lake Champlain. 36p. (Ass. doc. 1825, no. 183)

U. S.—Roads and canals, Committee on. Report on memorial of citizens of New York to construct a canal between Lakes Champlain and Ontario, May 22, 1826. (U. S.—House—19th Cong. 1st Sess. Rep. 230)

American geographical and statistical society. Memorial on canal connection of Champlain valley with St. Lawrence river. 8p. (Sen. doc. 1857, no. 14)

Johnson, F. S. S. Proposed Lake Champlain-St. Lawrence canal. (see Consular report, May, 1903, v.72, no. 272, p.108-9)

### Sharon canal.

The Sharon canal. (see Alb. daily advertiser, Dec. 28, 1822) 300 words. N. Y. state lib.  
From *Poughkeepsie journal*. Historical review of proposed canal.

An act to incorporate the New York and Sharon canal company, passed Apr. 19, 1823. (see Laws of New York)  
Also Sen. doc. 1823, no. 134.

N. Y. (state)—Select committee Report on petition of William Taber and others for a canal from the Connecticut line to the Hudson, near Croton. 1p. (Sen. doc. 1823, no. 135)

Thoughts on the projected eastern canal, Sharon to New York city. (see Alb. daily advertiser, Feb. 3, 1823) 1600 words.  
Signed "S. M." Advantages.  
N. Y. state lib.

An act relative to the New York and Sharon canal company. 2p. (Ass. doc. 1826, no. 163)

Memorial of the New York and Sharon canal company for additional corporate powers. 2p. (Ass. doc. Feb. 27, 1826)

N. Y. (state)—Select committee. Report on memorial praying for such amendments to, or modification of the act incorporating the New York and Sharon canal company as shall secure those along its route against all losses or damages which they may sustain by reason of the diversion of any rivers or streams of water. (see Sen. jour. 1826, 49:131)



Young, George W. Report to canal commissioners on surveys and estimates for a canal from Sharon to the tide-waters of the Hudson, at or below mouth of Croton river. (*see* Ass. jour. 1826, 49:662-64)

An act to survey route of a canal from Croton river to Sharon in Connecticut, passed Apr. 30, 1829. (*see* Laws of New York)

#### Sodus canal.

N. Y. (state)—Canal commissioners. Report on proposed canal from Clyde to Sodus Bay. (*see* Ass. jour. 1827, 50:986-87)

An act to incorporate the Sodus canal company, passed Mar. 19. 7p. (Sen. doc. 1829, no. 74)  
Also in *Laws of New York*.

Campbell, William. Survey of a canal route, from Montesuma on the Erie canal, to Sodus Bay on Lake Ontario. 6p. Q. (Sen. doc. 1829, no. 72; or, Sen. jour. 1829, v.52, Appendix C)

N. Y. (state)—Canals, Committee on. Report on the petition of W. N. Lummis and others for the Sodus canal. 2p. (Sen. doc. 1829, no. 73; or, Sen. jour. 1829, 52:158-59)

Remarks respecting the Sodus canal and its probable, immediate and prospective revenue. 24p. O. N. Y. 1832. 386

Includes Reports and estimates, Oct. 1831, by J. G. Swift, p.17-21; also a letter from James Renwick, p.22-24.

Advantages, means of communication, source of water-power, drainage of Cayuga marshes.

Sodus canal. (*see* Amer. R. R. jour. 1832, 1:300) 225 words. 620.5 qJ2

Concerning subscriptions for the Sodus canal stock.

An act passed Apr. 4, 1835, to revive and continue the act entitled "An act to incorporate the Sodus canal company" passed Mar. 19, 1829. (*See* Laws of New York)

An act to increase the capital and extend the powers of the Sodus canal company, passed Apr. 30, 1836. (*see* Laws of New York)

Sodus bay ship canal. (*see* Amer. R. R. jour. 1836, 5:552) 400 words. 620.5 qJ2

From the *Wayne county gazette*  
The launching of the enterprise.

N. Y. (state)—Canal board. Report relative to canal at Sodus. 2p. (Ass. doc. 1850, no. 151)

An act to revive and amend the several acts to incorporate and to increase the capital and extend the powers of the Sodus canal company, passed June 27, 1851. (*see* Laws of New York)

N. Y. (state)—Canals, Committee on. Report on renewal of charter of Sodus canal company. 6p. (Ass. doc. 1851, no. 64)

Adverse report by Mr. Burroughs of committee, 16p. (Ass. doc. 1851, no. 65).

N. Y. (state)—Canals, Committee on. Report on extension of time to Sodus canal company to complete canal. 4p. (Sen. doc. 1864, no. 62)

N. Y. (state)—Canal commissioners. Proceedings in 1837 authorizing crossing Erie canal by Sodus canal near village of Clyde. 2p. (Sen. doc. 1865, no. 43)

N. Y. (state)—Canal board. Proceedings relating to Sodus canal company. 4p. (Sen. doc. 1866, no. 43)

N. Y. (state)—Canal board. Proceedings relating to Sodus canal company. 7p. (Sen. doc. 1868, no. 57)

#### Miscellaneous projects.

An act for incorporating the Chittenengo canal company, passed Mar. 6, 1818. (*see* Laws of New York)

Mills, Robert. Advantages of connecting Lake Erie with the Ohio and the fear of New York's participation in the work. (*see* his Treatise on inland navigation. 1820. foot-note, p.40-46)  
386 M62

An act to incorporate the Ontario canal company, passed Mar. 31, 1821. (*see* Laws of New York.)

Report on the subject of a communication between Canandaigua lake and the Erie canal, made on Dec. 21, 1820, at a meeting of the citizens of Canandaigua and its vicinity, by the committee appointed at a previous meeting. 23p. O. Canandaigua, 1821. 626

N. Y. (state)—Canals, Committee on. Report as to a canal between the St. Lawrence and the Susquehannah. (*see* Ass. jour. 1822, p. 724-25)

Project for a canal from Canandaigua lake to the great canal. (*see* Niles' register, Dec. 13, 1823, 25:230) 75 words. 305 qN59

- An act, "to incorporate the Canassaraga canal company." 4p. (Ass. doc. 1824, no. 141)
- An act to incorporate the Onondaga canal company, passed Nov. 25, 1824. (*see Laws of New York*)
- N. Y. (state)—Attorney-General. Report on the petition of certain persons owning mills on the Canandaigua outlet of the Clyde river relative to probable damages from Canandaigua canal. 2p. (Ass. doc. 1824, no. 108)
- An act to incorporate the Granville canal company, passed Apr. 18, 1825. (*see Laws of New York*)
- A act to incorporate the Delaware and Susquehannah navigation company, passed Apr. 20, 1825. (*see Laws of New York*)
- An act to provide for the survey of certain canal routes therein mentioned, passed Apr. 20, 1825. (*see Laws of New York*)
- Seventeen routes. Also incomplete form in *Sen. doc.* 1825, no. 232.
- An act to amend the act passed Apr. 18, entitled "an act to incorporate the Granville canal company," passed Apr. 21, 1825. (*see Laws of New York*)
- Canal meetings. (*see Alb. daily advertiser*, Feb. 5, 1825) 1400 words. N. Y. state lib. From *Ithaca journal*.
- Relative to canal from Cayuga lake to Susquehanna river, Pa.
- An act to incorporate the Cohoes company, passed Mar. 28, 1826. (*see Laws of New York*)
- An act to provide for the survey of certain canal routes therein mentioned, and for other purposes. 2p. (Ass. doc. 1826, no. 259)
- N. Y. (state)—Canal commissioners. Report in pursuance of the act, entitled "an act to provide for the survey of certain canal routes therein mentioned." 29p. (Ass. doc. 1826, no. 182)
- Fifteen routes.
- N. Y. (state)—Canals, Committee on. Report as to the expediency of a survey from the Champlain canal near Whitehall, to Rutland, Vermont. (*see Ass. jour.* 1826, 49:770)
- Report on communication of canal commissioners made pursuant to the "act to provide for the survey of certain canal routes," passed Apr. 20, 1825. (*see Sen. jour.* 1826, 49: 573-77)
- Routes considered—Erie canal to foot of sloop or schooner navigation upon the River St. Lawrence; the several routes from Erie canal to Allegheny river; Portland on Lake Erie to the head of Chautauqua lake.
- Report on memorials of the inhabitants of the counties of Montgomery and Hamilton relative to a survey of a canal between the Erie canal and Sacandago river. (*see Sen. jour.* 1826, 49:562-63)
- Report on petition of N. P. Randall and others, praying to be incorporated to construct a canal from Manlius to the feeder taken from the Limestone creek, for the Erie canal. (*see Ass. jour.* 1826, 49:985-86)
- Report relative to certain canal routes therein mentioned. 2p. (Ass. doc. 1826, no. 258)
- Nine routes.
- Tibbits, George. Suggestions as to routes for western end of Boston and Albany canal, from state boundary line to Troy. (*see Mass.—Canal route commissioners. Report.* 1826. p.17-22) 386 M38
- Clinton, DeWitt, jr. Report on the survey of the Susquehannah and Lake Summit canal routes. 44p. F. (Ass. doc. 1827, no. 54; or, Ass. jour. 1827, v.50. Appendix B)
- N. Y. (state)—Canal commissioners. Report on petition of sundry inhabitants of Erie county relative to the construction of a tow-path along Ellicot's creek. (Ass. jour. 1827, 50:719)
- N. Y. (state)—Canals, Committee on. Report on divers petitions from different sections of the state, praying for the construction of canals. (*see Ass. jour.* 1827, 50:1127-28)
- Report on petitions for the construction of a navigable communication between the Erie canal and the northern and southern waters of the state. 2p. (Ass. doc. 1827, no. 31)
- An act to incorporate the Auburn and Owasco canal company, passed Apr. 21, 1828. (*see Laws of New York*)
- An act to incorporate the Manlius canal company, passed Apr. 15, 1828. (*see Laws of New York*)
- An act to incorporate the Wallabocht canal company, passed Apr. 9, 1828. (*see Laws of New York*)

An act to incorporate the Ellicott's creek-slack water navigation company, passed Apr. 23, 1829. (*see Laws of New York*)

An act to incorporate the Owaseo and Erie canal company, passed May 1, 1829. (*see Laws of New York*)

An act to incorporate the Scottsville canal company, passed Apr. 30, 1829. (*see Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on petition relative to incorporation of the "Owasco and Erie canal company." (*see Ass. jour. 1829, 52:898-902*)

N. Y. (state)—Legislature. Concurrent resolutions for surveys and estimates for a navigable communication from Otsego lake, through the valleys of the Susquehannah and Chemung rivers, to the Chimney narrows; also for connecting the Otsego lake with the Erie canal, passed Apr. 29, 1829. (*see Laws of New York*)

N. Y. (state)—Select committee. Report on petition of inhabitants of Amherst, Alden, Clarence and Erie for incorporation of Ellicott's creek slack-water navigation company. (*see Ass. jour. 1829, 52:677-78*)

N. Y. (state)—Select committee. Report on petition praying for an act to incorporate the Cato canal company. 2p. (*Ass. doc. 1830, no. 421*)

An act to incorporate the Oswegatchie navigation company, passed Apr. 25, 1831. (*see Laws of New York*)

An act to incorporate the Rochester canal and railroad company, passed Mar. 26, 1831. (*see Laws of New York*)

An act to incorporate the Auburn and Owaseo canal company, passed Mar. 30, 1832. (*see Laws of New York*)

N. Y. (state)—Canal commissioners. Report on petition of Augustus Porter and others for incorporation and authority to establish a factory and to make a canal from Tonnewanta creek to Niagara Falls. 3p. (*Ass. doc. 1832, no. 113*)

Supplemental report of commissioners on above petition (*Sen. doc. 1833, no. 29*).

N. Y. (state)—Canals, Committee on. Report on petition of Harvey Edwards and others praying that state will acquire title to their canal and lock near Limestone creek feeder. 2p. (*Sen. doc. 1833, no. 83*)

An act to renew the charter of the Auburn and Owaseo canal company, passed May 3, 1834. (*see Laws of New York*)

N. Y. (state)—Canal commissioners. Report on petition of Cohoes company for power to complete their canal. 11p. (*Ass. doc. 1834, no. 227*)

An act to increase the capital stock of the Auburn and Owaseo canal company, passed Apr. 14, 1836. (*see Laws of New York*)

An act to incorporate the Salmon river harbor canal company, passed May 16, 1837. (*see Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on petitions for survey of a canal from Sacandaga river to the Erie canal. 4p. (*Ass. doc. 1837, no. 157*)

Majority report on petitions for survey for canal route from Schoharie creek to Catskill. 6p. (*Ass. doc. 1837, no. 280*)

An act to incorporate the Wallabout canal company, passed Apr. 18, 1838. (*see Laws of New York*)

N. Y. (state)—Canals, Committee on. Report on petitions of inhabitants of Chautauqua and Cattaraugus counties, for survey of canal route from Buffalo to Lake Erie. 4p. (*Ass. doc. 1838, no. 243*)

Report on petitions of inhabitants of Schoharie and Greene counties, relative to a canal from Erie canal to Catskill. 3p. (*Ass. doc. 1838, no. 212*)

An act to provide for a survey of the Connewango canal route, passed May 4, 1839. (*see Laws of New York*)

Canal from the headquarters of the Hudson to the Champlain or Erie canal. (*see Alb. daily argus, Jan. 9, 1839*) 500 words. N. Y. state lib.

Report of meeting of citizens of Saratoga county to promote its construction.

Canal meeting. (*see Alb. evening jour. Oct. 11, 1839*) 700 words. N. Y. state lib.  
Meeting of inhabitants of Hamilton, Fulton and Saratoga counties, held at Northampton, to secure construction of canal from Murphy's Mills to Northampton.

- N. Y. (state)—Canals, Committee on. Report on petitions for a branch canal from Erie canal to Catskill. 4p. (Ass. doc. 1839, no. 251)
- Hoffman, George E. Report to the Governor on survey for a canal from the upper branches of the Hudson river. p.7-12. (Ass. doc. 1840, no. 3)
- N. Y. (state)—Canal board. Report on the continuation of the survey and estimate of a canal route from the northern branches of the Hudson. 3p. (Ass. doc. 1840, no. 275)
- N. Y. (state)—Canal commissioners. Report on the survey of the Conewango canal. 119p. (Ass. doc. 1840, no. 160)
- N. Y. (state)—Canals, Committee on. Report on the petition for the construction of the Sacandaga canal. 5p. (Ass. doc. 1840 no. 335)
- N. Y. (state)—Canal board. Report on the bill entitled an act for the relief of the Scottsville canal association. 4p. (Sen. doc. 1841, no. 72)
- N. Y. (state)—Surveyor-General. Report on state lands lying within fifteen miles of proposed railroad and slack-water route from Lake Champlain to Oneida county. 5p. (Sen. doc. 1846, no. 88)
- N. Y. (state)—Canals, Committee on. Report on petitions for survey for canal from Sacandaga river to Erie canal. 4p. (Ass. doc. 1847, no. 157)
- N. Y. (state)—Canal board. Report on bill to incorporate Cayuga and Ontario canal company. 3p. (Ass. doc. 1863, no. 193)
- N. Y. (state)—Engineer and Surveyor. Proposed canal between Hempstead Bay and Jamaica Bay on Long Island. (see Annual report for 1902, p.32) 626 L1  
Law directing survey, 1902, chapter 262.
- Rafter, George W. Private companies organized to build canals. (see his Hydrology of the state of New York. 1905. p.322-24) 507 O8 v.24

## TRAVEL ON THE CANALS.

- Inland navigation of New York in 1738, a description. (see N. Y. (state)—Legislature. Documents relative to the colonial history of New York, 5:729-30; 6:113, 122) 974 qN421
- Schultz, Christian. Travel from Albany to Oswego, 1807. (see his Travels on an inland voyage. 1810. 1:2-28) 917.3 Sch8
- Erie canal. (see Alb. daily advertiser, Dec. 10, 1822) 400 words. N. Y. state lib.
- Extent of passenger traffic on canal.
- Great western canal. 8p. O. 386
- Signed "W. G." Letter written June 20, 1822, after completing tour from New York to Niagara Falls and back to Saratoga Springs.
- Villages on the Erie canal. (see Alb. daily advertiser, Jan. 7, 1823) 700 words. N. Y. state lib.
- Danger of too many villages.
- A journal of a voyage from Albany to Schenectady on the canal. (see Alb. daily advertiser, July 2, 1824) 4900 words. N. Y. state lib.
- Signed "A stranger and traveler."
- Description of canal structures, surroundings, etc.
- ✓ Canal anecdotes. (see Niles' register, 1825, 28:227) 400 words. 305 qN59
- Sketch of settlements along the canal. (see Niles' register, 1825, 28:261) 500 words. 305 qN59
- From New York national advertiser.
- Spencer, Caroline. Journey by canal from Schenectady to Oswego, 1835, from her journal. (see Mag. of Amer. hist. 1889, 22:332-33) 973 M27
- Seward, William H. Journey with his family from Albany to Utica on a "line-boat," 1839. (see his Autobiography. p.410-11) 923.27 Se81
- Abbot, Rev. Jacob. Marco Paul's travels and adventures in the pursuit of knowledge. 72p. illus. S. Bost. 1843. 386.
- Canal villages. (see Turner, Orsamus. Pioneer history of the Holland purchase. 1850. Appendix, p.653-58) 974.79 T85
- Pioneer sketches of villages created by the Erie canal: Black Rock, Tonawanda, Lockport, Middleport, Medina, Albion.
- Tables of principal places on the canals and their distances from each other. (see N. Y. (state)—Canal commissioners. Reports for 1868-73) 626 H7

- Rideing, W. H. The waterways of New York. (*see Harper's mag.* 1873, 48:1-17) 051 H23  
 Illustrated description of a journey from Whitehall to Buffalo via New York city.
- ✓Hopkin, A. G. Between Albany and Buffalo, early methods of transportation and travel. (*see Mag. of Amer. hist.* 1888, 19:302-13, 401-10) 973 M27
- ✓Ringwalt, John Luther. Travel on the Erie canal. (*see his Development of transportation systems in the U. S.* 1888, p.50) 385 qR47  
 Reference to accounts of Horace Greeley and T. L. Kenney.
- Sanderson, L. J. How we towed our way; or, By canal thro' the Empire state, New York to Buffalo. (*see Outing*, 1893, 22:272-78) 796 Ou8
- Johnson, Clifton. Canal-boat voyage on the Hudson. (*see Outlook*, 1898, 60:309-18) 205 C4623
- McAllister, C. A. From sea coast to lakes. (*see Marine engineering*, Feb. 1904) 4500 words.  
 An interesting account of an all water trip from New York to Milwaukee, Wis. Illustrated.
- Christmas on canal-boat. (*see The argus*, Albany, Dec. 25, 1905, p.5) 071 xA11
- N. Y. (state)—Public Works, Superintendent of. Pleasure craft on the canals. (*see his Annual report for 1905*) 386 N425

## MISSIONS.

- Eaton, M. Five years on the Erie canal; an account of five years missionary labor. 156p. 8. Utica, 1845. 266 Ea8

## SUNDAY OPENING.

- N. Y. (state)—Incorporation of charitable and religious societies, Committee on. Report on petitions praying for the passage of an act to prohibit the lock-keepers on the canals from opening the locks on Sunday. (*Ass. doc.* 1825, no. 260; or, *Ass. jour.* 1825, 48:1149)
- N. Y. (state)—Canal commissioners. Report on Sunday closing of locks. 5p. (*Sen. doc.* 1844, no. 66)
- N. Y. (state)—Canals, Committee on. Report in relation to the observance of the Sabbath on the canals. 15p. (*Sen. doc.* 1844, no. 119)
- New York Sabbath convention. Sentiments expressed by the committee on canals to the Senate, Apr. 10, 1844. p.1-2, O. 040 P v.1859
- N. Y. (state)—Canals, Committee on. Report on numerous memorials praying that the locks on the canals may be closed on Sundays. 9p. O. (*Ass. doc.* 1845, no. 148)
- N. Y. (state)—Select committee. Report on the memorial relative to the closing of canal-locks on Sunday. 2p. (*Sen. doc.* 1849, no. 61)
- N. Y. (state)—Canals, Committee on. Report on the closing of canal-locks on Sunday. 4p. (*Sen. doc.* 1858, no. 77)  
 Minority report, 7p. (*Sen. doc.* 1858, no. 91).
- N. Y. (state)—Grievances, Committee on. Report on the closing of canal-locks on Sunday. 7p. (*Ass. doc.* 1858, no. 134)  
 Minority report, 8p. (*Ass. doc.* no. 137).

## INTOXICATING LIQUORS ON CANAL LANDS.

- N. Y. (state)—Select committee. Report relative to laying a duty on boats carrying passengers and selling spirituous liquors on the canals. (*see Ass. jour.* 1824, 47:1011)
- N. Y. (state)—Canals, Committee on. Report on petition of inhabitants of Amsterdam and Florida for removal of grog shops from canal lands. 3p. (*Sen. doc.* 1843, no. 122)

## TOPOGRAPHIC SURVEYS; PRECISE LEVELING AND BENCH MARKS; ALTITUDES, ETC.

- Johnson, Edwin F. Method of conducting the canal surveys in the state of New York. (*see Amer. R. R. jour.* 1833, 2:338-39) 3600 words. 620.5 qJ2  
 From *American journal of science and arts*, 1833, 24: 19-28 (505 H7).  
 Also in volume of pamphlets (040 P v.223).  
 Detailed description of advantages of method.

Machin, Thomas. Governor George Clinton and the New York canals. (*see* Amer. hist. rec. 1873, 2:162-64) 973 qAm3

Letter written while making a survey between Albany and Schenectady for a canal for supplying Albany with water.

Includes a table of levels taken from the water beam of the city hall at Albany and continued to Schenectady on Mohawk river.

N. Y. (state)—Engineer and Surveyor. Topographical survey of the state. (*see* Annual report for 1894—date) 626 L1

Topographical survey of the upper Hudson river valley, *see* reports for 1895, p.29-50 and 1896, p.51-161.

Elevations for the Great Lakes and for the St. Lawrence and Hudson rivers. (*see* U. S.—Deep waterways commission. Report, 1897. p.69-96) 386 Un3

Notes by J. E. Maloney.

1. Primary leveling; 2. Special discussions; 3. Notable elevations, bench marks and reference planes; 4. Reference planes and depths for harbor and channel improvements. *See* also p.49-50; profile no. 10.

U. S.—Geological survey. Topographical maps of New York, 1898—date. 912.747

——— Topographic atlas of the United States. Maps. sq. F°. Wash. 1898—date. 557.3 xP8

Gannett, Henry. Dictionary of altitudes in the United States. Ed. 3. 775p. Wash. 1899. (U. S.—Geological survey. Bulletin, no. 160) 557.3 O4

Molitor, David. Precise levels along St. Lawrence river and Lake St. Clair, 1899. p.991-1009, Q. (U. S.—House—56th Cong. 2d Sess. Doc. no. 149, pt.2. Appendix no. 20) 626.9 qQ0

Atlas. v.3.

Description and elevation of bench marks, 1900. p.1015-43, Q. (U. S.—House—56th Cong. 2d Sess. Doc. no. 149, pt.2. Appendix, no. 22) 626.9 qQ0

Atlas. v.3.

Landreth, William B. Recent stadia topographic surveys; notes relating to methods and costs. (*see* Amer. soc. civ. eng. Transactions, Dec. 1900, 44:192-99) 620.6 N2

Discussion by Emile Low, J. F. Wallace, H. B. Magor, R. S. Buck, A. J. Himes, R. A. MacGregor, Kenneth Allen, Wager Fisher, G. L. Christian, G. W. Rafter and W. B. Landreth, p.100-18.

N. Y. (state)—Engineer and Surveyor. List of bench marks New York state canals. (*see* Annual report for 1901, p.655-711) 626 L1

——— Report on the spirit levels of the New York state barge canal survey of 1900-1901. (*see* Annual report for 1901, p.617-53) 626 L1

Whitford, Noble E. *comp.* Compilation of bench marks and azimuth lines in the state of New York. (*see* N. Y. (state)—Engineer and Surveyor. Annual report for 1904. 55:729-800) 626 L1

Bench marks from the United States geological survey, and azimuth lines from United States geological survey and New York State barge canal survey.

Gannett, Samuel S. and D. H. Baldwin. Results of spirit leveling in the state of New York for the years 1896 to 1905 inclusive. 100p. O. Wash. 1906. (U. S.—Geological survey. Bulletin 281) 557.3 O4

## MAPS AND PLANS.

The following maps and plans are, in most cases, in the New York state documents. The letters C.C., Eng. or P.W., as given after the document number, indicate the annual reports of the Canal Commissioners, the State Engineer and Surveyor or the Superintendent of Public Works; e.g. (Ass. doc. 1863, no. 7—C.C.) is the annual report of the Canal Commissioners in the Assembly documents of 1863, number 7.

For a list of maps before 1859, *see* also *Catalogue of maps and surveys in the offices of the Secretary of State, State Engineer and Surveyor, and Comptroller, and the New York State Library, 1859* (016.912747 N42).

### General.

Includes matter relating to more than one canal.

New map of the Hudson river, the post roads between New York and Albany, the northern and western canals etc. 123×12.2 cm. T. Alb. 1829 912.747 C14

Scale 4 miles to an inch.

With table of distances of places on the canals from the sloop lock at Albany.

Guide to Burr's map of New York and steamboat, stage and canal register for 1834. 35p. 1 map, T. N. Y. 1834. 912.747 YB94

Map of the railroads and canals in the United States and Canada, with a description of each, edited by D. K. Minor. 72p. map 60×93½ cm. N. Y. 1834. 385 M661  
Scale 50 miles to an inch.

Map of the state of New York, showing the courses of railroads, canals and stage roads, by J. C. Smith. 49×63 cm. folded T. N. Y. 1842. 912.747 Sm5  
Scale 18½ miles to an inch.

Agricultural and geological map of the state of New York, compiled by legislative authority. 93×101¼ cm. folded F. N. Y. 1844. 912.747 qN42

Diagrams showing the forms of prisms of the old and new canals. About 8½×11 inches. (Ass. doc. 1850, no. 45—C.C.)

Map of the various channels for conveying the trade of the Northwest to the Atlantic seaboard, exhibiting the tributaries and drainage of the trade into each and the effect of the enlargement of the Erie canal. About 31×52 inches. (Ass. doc. 1853, no. 28—Eng.)

Map of the state of New York, showing its water and railroad lines. 20×25½ inches. (Ass. doc. 1854, no. 60—Eng.)

Map of the various channels for conveying the trade of the Northwest to the Atlantic seaboard, exhibiting the tributaries and drainage of the trade into each and the effect of the enlargement of the Erie canal. 20×25½ inches. (Ass. doc. 1854, no. 60—Eng.)

Engravings of plans, profiles and maps, illustrating the standard models from which are built the important structures on the New York canals, compiled by S. H. Sweet, 15 plans, O. accompanying the annual reports of the State Engineer and Surveyor for 1859. Alb. 1860. 626 M6

*Contents:*

- A. General plans for timber locks, Chemung canal, scale 8 feet to an inch.
- B. General plan for road bridge, Erie canal enlargement, size 16×22 inches.
- C. General plan of aqueduct; elevation of Seneca river aqueduct, size 17×45 inches.
- D. General plan of Whipple's patent arch truss bridge, 72 feet span, scale of plan and elevation 3 feet to an inch, scale of details, 2 feet to an inch.
- E. General plan of Whipple's patent arch truss bridge, 100 feet span, scale of plan and elevation, 5 feet to an inch, scale of details, 2 feet to an inch.
- F. General plan iron road bridges, Whipple's trapezoidal truss, scale of plan and elevation, 5 feet to an inch, scale of details 1 foot to an inch.
- G. Detail plan of dam and bulkhead, Rocky Rift feeder, size 16×25 inches.
- H. General plan of enlarged double locks, 8 feet lift, scale 12 feet to an inch.
- I. General plan of road and farm bridge superstructures, with iron chords and shoes, 72 feet span, size 21×25 inches.
- K. General plan of composite locks on Chemung canal, scale 8 feet to an inch.
- L. General plan for farm bridge, lateral canals, 50 feet span, scale 4 feet to an inch.
- M. General plan of waste-weir, scale 8 feet to an inch.
- N. Beardalee's plan of composite valve for enlarged locks, size 15×23 inches.
- O. General plan of culverts, size 19×25 inches.
- P. General plan of farm bridge and abutments, span 72 feet, scale 5 feet to an inch.

Map and profiles of New York state canals. 23×39 inches. (Ass. doc. 1859, no. 28—Eng.)

Profiles of the New York state canals and feeders, showing the elevations of the same above tide-water and the junction of the lateral canals with the Erie. 23×40 inches.

Ass. doc. 1863, no. 50—Eng.	Ass. doc. 1868, no. 23—Eng.
" 1864, no. 179—Eng.	" 1869, no. 4—C.C.
" 1865, no. 20—Eng.	" 1869, no. 11—Eng.
" 1866, no. 38—Eng.	" 1870, no. 4—C.C.
" 1867, no. 7—C.C.	" 1870, no. 25—Eng.
" 1868, no. 9—C.C.	

Scale about 10 miles to an inch. With inset showing canals and railroads of the state.

Map of New York and Pennsylvania, showing the canals and their connections. (Ass. doc. 1867, no. 7—C.C.)

Map of the New York state canals and railroads completed and in progress. 22×28 inches.

Ass. doc. 1868, no. 23—Eng.	Ass. doc. 1870, no. 25—Eng.
" 1869, no. 11—Eng.	" 1871, no. 19—Eng.

Geological map of the state of New York, compiled from public and private surveys by C. H. Hitchcock. (see Asher and Adams, comp. New topographical map of the state of New York. 1869, p.3 4) 912.747 fAs3

Map of Pennsylvania, showing routes by railroad and water from the coal fields into the state of New York. 20½×29½ inches.

Ass. doc. 1869, no. 4—C.C.
" 1869, no. 11—Eng.

Northern region between the Atlantic and Pacific, showing the chains of lakes, etc., 1868. 8½×34 inches. (Ass. doc. 1869, no. 11—Eng.)

Profiles of the New York state canals and feeders, showing the elevations of the same above tide-water and the junction of the lateral canals with the Erie. 23×40 inches.

Ass. doc. 1874, no. 6—C.C.	Ass. doc. 1882, no. 54—Eng.
" 1875, no. 6—C.C.	" 1883, no. 9—P.W.
" 1876, no. 6—C.C.	" 1883, no. 9—Eng.
" 1877, no. 45—C.C.	" 1884, no. 9—P.W.
" 1877, no. 50—Eng.	" 1885, no. 38—Eng.
" 1878, no. 12—C.C.	" 1885, no. 9—P.W.
" 1878, no. 9—Eng.	" 1886, no. 31—P.W.
" 1879, no. 41—Eng.	" 1887, no. 24—P.W.
" 1879, no. 12—P.W.	" 1888, no. 24—P.W.
" 1880, no. 88—Eng.	" 1889, no. 21—P.W.
" 1880, no. 69—P.W.	" 1890, no. 18—P.W.
" 1881, no. 28—Eng.	" 1891, no. 18—P.W.
" 1882, no. 13—P.W.	" 1893, no. 35—Eng.
	" 1894, no. 13—P.W.

Scale about 10 miles to an inch.

The figures expressing the elevations for 1877-93 are slightly changed from those of preceding years.

With an inset showing canals and railroads of the state.

Map of the state of New York, showing canals and railroads. 27½×33½ inches. (Ass. doc. 1875, no. 80—Eng.)

Map showing the existing and proposed transportation routes from the Mississippi to the seaboard. (Ass. doc. 1875, no. 6—C.C.)

Scale about 47 miles to an inch.

With insets of profiles of Erie and Champlain canals.

Profiles of the St. Lawrence and of the Erie canal routes between Lake Erie and tide-water. (Ass. doc. 1879, no. 41—Eng.)

Scale 10 miles to an inch.

Map showing disposition of surplus canal waters. 14×32 inches. (Ass. doc. 1880, no. 69—P.W.)

Scale 2 chains to an inch.

Map of the chain of American lakes, and canals connected therewith. (Ass. doc. 1881, no. 28—Eng.)

Scale 80 miles to an inch.

With insets of a profile of the Illinois and Michigan canal and Illinois river from Chicago to Grafton, showing locks and dams for its improvement, scale about 16 miles to an inch longitudinally; of a profile and map of the Fox and Wisconsin river improvement, scale for map 20 miles to an inch, scales for profile 170 feet to an inch vertically, 28 miles to an inch horizontally; of map of the proposed northern water route from Lake Superior to the Red River of the North, scale 20 miles to an inch; and of the map of the St. Mary's Falls canal, scale 533½ feet to an inch.

New York state canals, eastern division. 32×49 inches.

Ass. doc. 1882, no. 13—P.W.

Ass. doc. 1883, no. 24—P.W.

" 1883, no. 9—P.W.

" 1894, no. 12—P.W.

Scale 2 miles to an inch.

Map of northern New York, showing the Adirondack region. 12×13 inches. (Ass. doc. 1884—Eng.) 626 L1

Scale 15 miles to an inch.

U. S.—Geologic survey. Geologic atlas of the United States, folio 1—maps, F<sup>6</sup>. Wash. 1894— 557.3 xP1

Topographical maps of the state of New York. F<sup>6</sup>. Wash. 1894— 912.747

Economic and geologic map of New York, by F. J. H. Merrill. 59×67 cm., bound O. N. Y. 1895. 557.47 P56

Scale 14 miles to an inch.

Reprinted, 1901, to accompany the report of the New York state canal survey for 1900. (626 L1).

For a description of this map, see *Bulletin* 56 of the New York State Museum, 37p. 2 maps, table (557.47 Q1).

Progress maps of New York, showing atlas sheets surveyed by the United States geological survey in co-operation with the State Engineer and Surveyor for 1894, 1896, 1897, 1898, 1900, 1901, 1902 and 1903 respectively. Size about 7×10 inches.

Ass. doc. 1895, no. 89—Eng.

Ass. doc. 1901, no. 54—Eng.

" 1897, no. 73—Eng.

" 1902, no. 31—Eng.

" 1898, no. 67—Eng.

" 1903, no. 39—Eng.

" 1899, no. 72—Eng.

" 1904, no. 65—Eng.

Triangulation in New York. 9½×9 inches (Ass. doc. 1895, no. 89—Eng.)

Scale about 40 miles to an inch.



Canal improvement, profiles of the Erie, Champlain and Oswego canals.  $14\frac{1}{2} \times 27\frac{1}{2}$  inches

Ass. doc. 1898, no. 67—Eng.

" 1899, no. 72—Eng.

" 1900, no. 39—Eng.

Shows location, numbers and extent of contracts; those completed, those under construction and those yet to be awarded; also names of contractors to Apr. 1, 1898.

Co-operative topographic survey; triangulation in New York.  $7\frac{1}{2} \times 7\frac{1}{2}$  inches. (Ass. doc. 1898, no. 67—Eng.)

Scale about 50 miles to an inch.

Illustrations of tablets, posts, etc., placed by official surveying parties. 4 plates. (Ass. doc. 1898, no. 67—Eng.)

Maps and profiles accompanying the report of the State Engineer and Surveyor on the Barge canal, 1901. 628 qQ1a

*Contents of atlas:*

1. Map of the canal system of New York, scale about  $5\frac{1}{2}$  miles to an inch.
2. Alternate routes, Cohoes and vicinity, scale 600 feet to an inch.
3. Alternate routes, Rome and vicinity, scale 1 mile to an inch.
4. Alternate routes, Syracuse and vicinity, scale 1 mile to an inch.
5. Alternate routes, Rochester and vicinity, scale 1 mile to an inch.
6. Alternate routes, Niagara river and vicinity, scale 1 mile to an inch.
7. Alternate routes, Buffalo and vicinity, scale 1 mile to an inch.
8. Profile of water-surfaces of Erie canal, scales 8 miles to an inch and 40 feet to an inch.
9. Profile of water-surfaces of Erie canal, Rexford Flats to Oneida lake, scales 8 miles to an inch and 40 feet to an inch.
10. Profile of water-surfaces of Champlain canal, scales  $\frac{1}{2}$  mile to an inch and 40 feet to an inch.
11. Profile of water-surfaces of Oswego canal, scales 1 mile to an inch and 40 feet to an inch.
12. Profile of water-surfaces of Lockport-Olcott route, scales 1 mile to an inch and 40 feet to an inch.
13. Cross-sections for 12-ft. depth of water, scale about  $13\frac{1}{2}$  feet to an inch.
14. Cross-sections for 7-ft. depth of water, scale about  $13\frac{1}{2}$  feet to an inch.
15. Cross-sections for 9-ft. depth of water, scale about  $13\frac{1}{2}$  feet to an inch.
16. Standard highway bridge, Erie and Oswego canals, scale 6 feet to an inch.
17. Standard farm bridge, Erie and Oswego canals, scale 6 feet to an inch.
18. Standard highway bridge, Champlain canal, scale 6 feet to an inch.
19. Standard farm bridge, Champlain canal, scale 6 feet to an inch.
20. Standard lift-bridge, Erie canal, scale about  $4\frac{1}{2}$  feet to an inch.
21. Dive culvert for 12-ft. depth of water, scale 1 foot to an inch.
22. Standard lock for Erie and Oswego canal, scale about  $13\frac{1}{2}$  feet to an inch.
23. Standard lock for Champlain canal, scale about  $13\frac{1}{2}$  feet to an inch.
24. Flight of locks at Cohoes, scale about  $13\frac{1}{2}$  feet to an inch.
- 24a. Plan of wiring system of locks, scales  $1\frac{1}{2}$ ,  $2\frac{1}{2}$  and 12 feet to an inch.
25. Lower lock-gate for 20-ft. lift, scale 1 foot to an inch.
26. Drainage basins of Mohawk, Black and Oneida rivers, scale  $3\frac{1}{2}$  miles to an inch.
27. Rainfall data, etc., in central and eastern part of state, scale 1 mile to an inch.
28. Drainage basins of Mohawk and Oneida rivers, with rainfall contours, etc., scale 12 miles to an inch.
29. Relation of rainfall to run-off in different months, size  $14 \times 21$  inches.
30. Reservoir sites and feeder on West Canada and Nine Mile creeks, scale 1 mile to an inch.
31. Profiles showing portions of Erie and Champlain canals, gaged in 1900, scales 11 miles, 200 feet and 30 feet to an inch.
32. Typical diagrams relating to canal gaging, size  $20 \times 24$  inches.
33. Flood discharge in relation to size of drainage basin, size  $8 \times 11$  inches.
34. Geological map of state of New York, scale about 13 miles to an inch.

Map showing present and proposed canal system.  $7\frac{1}{2} \times 14\frac{1}{2}$  inches. (Ass. doc. 1904, no. 65—Eng.)

Scale about 23 miles to an inch.

### Erie Canal.

Topographical map of the country between the Mohawk river and Wood creek, from an actual survey taken in Nov. 1758. (see Plans and engravings in the documentary history of the state of New York. 1856) 912.747 xN

Scale 400 feet to an inch.

Copy of the original ms. in the state library.

Map illustrative of a communication between the Great Lakes and the Atlantic ocean by means of a canal from Lake Erie to Hudson's river, by J. H. Eddy, 1816. (New York state library, maps, v. 15) 912.747

Map and profile of the Erie canal.  $9 \times 44$  inches. (see Laws in relation to the Erie and Champlain canals. 1825. v. 1.) 386 qN42

Longitudinal scale 6 miles to an inch, vertical scale 90 feet to an inch.

Map of the country between the Genesee river and the head waters of Mud creek.  $4\frac{1}{2} \times 7\frac{1}{2}$  inches. (see Laws in relation to the Erie and Champlain canals. 1825. v. 1.) 386 qN42

Scale 2 miles to an inch.

Map of the Gerundegut embankment.  $4\frac{1}{2} \times 5\frac{1}{2}$  inches. (see Laws in relation to the Erie and Champlain canals. 1825. v.1.) 386 qN42  
Scale 12 chains to an inch.

Profile of the Erie canal from Albany to Syracuse.  $7 \times 22$  inches. (Ass. doc. 1847, no. 20—C.C.)

Statistical profiles of Erie canal, showing the enlargement on the eastern, middle and western divisions, 1851. Ass. doc. 1851, no. 45—Eng.

" 1852, no. 90—Eng.

Scale 3 miles to an inch.

Also in New York state library maps, v.15 (912.747).

Enlargement of the Erie canal; statistical profile of the eastern subdivision of the eastern division. (Ass. doc. 1852, no. 90—Eng.)

Horizontal scale  $\frac{1}{2}$  of a mile to an inch, vertical scale 50 feet to an inch.

Enlargement of the Erie canal; statistical profile of the western subdivision of the eastern division. (Ass. doc. 1852, no. 90—Eng.)

Horizontal scale  $1\frac{1}{2}$  miles to an inch, vertical scale 50 feet to an inch.

General cross-sections of the canal where side docking is used and where vertical or battered walls are used.  $7\frac{1}{2} \times 11$  inches. (Ass. doc. 1852, no. 90—Eng.)

Map showing the relative position of the lakes at the head waters of the East Canada and Caroga creeks and the Erie canal from Little Falls to Fort Plain, with the several proposed routes for feeders to the Erie canal. (Ass. doc. 1852, no. 90—Eng.)

Scale about  $\frac{1}{2}$  of a mile to an inch.

Maps showing prism of canal.  $9 \times 14\frac{1}{2}$  inches. (Ass. doc. 1852, no. 90—Eng.)

Primary structure of the upper Mohawk aqueduct, and the upper Mohawk aqueduct for enlarged canal. (Ass. doc. 1852, no. 90—Eng.)

Scale 16 feet to an inch.

Location of the Erie canal at Holley. (Ass. doc. 1855, no. 32—C.C.)

Scale 8 chains to an inch.

Diagrams of the Erie canal, showing prism with and without bench, or partial walls. (Ass. doc. 1856, no. 180—Eng.)

Profile of the Erie canal, middle division, showing the condition of the enlargement, Jan. 1, 1857.  $6\frac{1}{2} \times 15\frac{1}{2}$  inches. (Ass. doc. 1857, no. 60—Eng.)

Longitudinal scale 3 miles to an inch.

Profile of the Erie canal, western division, showing the condition of the enlargement, Jan. 1, 1857.  $7 \times 28$  inches. (Ass. doc. 1857, no. 60—Eng.)

Longitudinal scale 3 miles to an inch.

Profile of the Erie canal, middle division, showing the condition of the enlargement, Jan. 1, 1858.  $6\frac{1}{2} \times 15\frac{1}{2}$  inches. (Ass. doc. 1858, no. 15—Eng.)

Profile of Erie canal, western division, showing the condition of the enlargement, Jan. 1, 1858.  $7 \times 28$  inches. (Ass. doc. 1858, no. 15—Eng.)

Scale about 5 miles to an inch.

Statistical profile of the Erie canal enlargement, eastern division, showing the condition of the enlargement, Jan. 1, 1858.  $7 \times 28$  inches. (Ass. doc. 1858, no. 15—Eng.)

Scale about 5 miles to an inch.

Two diagrams of width of canal. 1p. (Ass. doc. 1858, no. 15—Eng.)

Cross-section of Erie canal and enlarged boats. 1p. (Ass. doc. 1859, no. 28—Eng.)

Details of discharge pipes, masonry, etc., at De Ruyter reservoir.  $23\frac{1}{2} \times 28\frac{1}{2}$  inches. (Ass. doc. 1863, no. 50—Eng.)

Scales 20 feet and 5 feet to an inch.

Diagrams of enlarged Erie canal, showing the general plan of slope and vertical walls.  $8\frac{1}{2} \times 24$  inches. (Ass. doc. 1863, no. 50—Eng.)

Feeder dam and bulkhead for De Ruyter reservoir.  $6\frac{1}{2} \times 16\frac{1}{2}$  inches. (Ass. doc. 1863, no. 50—Eng.)

Scale 16 feet to an inch.

Map showing old and enlarged Erie canal west of Montezuma across the Cayuga marshes, showing the location of Richmond aqueduct.  $12 \times 23$  inches. (Ass. doc. 1863, no. 50—Eng.)

Map of proposed Fish creek feeder.  $16 \times 26$  inches. Ass. doc. 1864, no. 179—Eng.

" 1869, no. 11—Eng.

Scale  $\frac{1}{2}$  of a mile to an inch.

- Map of Albany basin, showing proposed improvement. 12×37 inches.  
 Ass. doc. 1865, no. 20—Eng.  
 " 1866, no. 38—Eng.  
 " 1867, no. 7—C.C.  
 Scale 2 chains to an inch.
- Plan of tree-dam across Schoharie creek. 14½×26 inches. (Ass. doc. 1865, no. 20—Eng.)  
 Scale 5 feet to an inch.
- Plan of dam and apron across the Mohawk river at Rexford Flats, Erie canal. 18½×30½ inches. (Ass. doc. 1867, no. 7—C.C.)
- Map showing the proposed improvement of the Erie canal and the Black Rock harbor in the city of Buffalo. 14½×16 inches (Ass. doc. 1868, no. 9—C.C.)
- Otisco lake reservoir. 10×32 inches. Ass. do. 1870, no. 4—C.C.  
 " 1870, no. 25—Eng.
- Scale 18 chains to an inch.
- Cast-iron discharge pipes, Woodhull reservoir. 17×23 inches.  
 Ass. doc. 1871, no. 6—C.C.  
 " 1871, no. 19—Eng.
- Scale 5 feet to an inch.
- Map showing the localities of the feeders and reservoirs now in use for supplying the Rome level of the Erie canal and of those proposed for construction by the canal commissioners in their report of Jan. 30, 1871. 24×33½ inches.  
 Ass. doc. 1871, no. 6—C.C.  
 " 1871, no. 19—Eng.
- Scale about 2½ miles to an inch.
- Map of proposed Sand lake reservoir, surveyed July, 1871. 21½×34 inches. (Ass. doc. 1872, no. 29—C.C.)  
 Scale 4 chains to an inch.  
 With profile and cross-section.
- Repairs and extension of tree-dam across Schoharie creek. 16½×30 inches. (Ass. doc. 1872, no. 29—C.C.)  
 Scales 40 and 6 feet to an inch.
- Jamesville reservoir on Butternut creek. (Ass. doc. 1874, no. 6—C.C.)  
 Scale of map of reservoir 6 chains to an inch.  
 Scale of plan 8 feet to an inch.  
 Scale of elevation of dam 30 feet to an inch.
- Cross-sections of the Erie canal, middle division. 8½×10½ inches.  
 Ass. doc. 1875, no. 80—Eng.  
 " 1876, no. 27—Eng.
- Elevation of miter-sill of the Erie canal at its entrance into the Albany basin. 11×18 inches. (Ass. doc. 1875, no. 80—Eng.)
- Map and profile of the western division of the Erie canal, 1875.  
 Ass. doc. 1875, no. 6—C.C.  
 " 1875, no. 80—Eng.
- Scale of map 2 miles to an inch.  
 Scale of profile, longitudinally 4 miles to an inch, vertically 1,000 feet to an inch.
- Map of the reservoirs, feeders and sources of water-supply for the middle division of the Erie canal. 21½×46 inches.  
 Ass. doc. 1875, no. 6—C.C.  
 " 1875, no. 80—Eng.  
 " 1876, no. 27—Eng.
- Scale 2 miles to an inch.
- Profile of the eastern division of the Erie canal, showing location of structures and vertical walls in detail, also general map and profile of the eastern division of the New York state canals, 1874.  
 Ass. doc. 1875, no. 6—C.C.  
 " 1875, no. 80—Eng.
- Horizontal scale ½ mile to an inch, vertical scale 50 feet to an inch.
- Erie basin and slips, Buffalo, showing the relative location and deposits. (Ass. doc. 1876, no. 27—Eng.)  
 Scale 2 chains to an inch.
- Map of the Ohio basin, showing the deposit. (Ass. doc. 1876, no. 27—Eng.)  
 Scale 40 feet to an inch.
- Map showing the territory to be drained by the Ferry and Bird Avenue receiving sewer, Buffalo, 1876. 12½×28 inches. (Ass. doc. 1876, no. 27—Eng.)

Plan of upper and lower Mohawk aqueducts, designed by S. E. Babcock. (Ass. doc. 1876, no. 6—C.C.)

Scale 4 feet to an inch.

Plans showing wall bench and slope and vertical walls, as now built.  $6\frac{1}{2} \times 25$  inches. (Ass. doc. 1876, no. 27—Eng.)

Section of the Erie canal showing the old wall benches; same with slope wall,  $1\frac{1}{2} : 1$ ; same with slope wall,  $1 : 1$ .  $8\frac{1}{2} \times 9\frac{1}{2}$  inches. (Ass. doc. 1876, no. 27—Eng.)

Ten diagrams of cross-sections of the Erie canal. 3 plates. (Ass. doc. 1876, no. 27—Eng.)

Map of Erie canal at Black Rock, showing the condition of the division wall between the canal and the harbor from Ferry street to Mill street, Sept., 1876. (Ass. doc. 1877, no. 50—Eng.)

Scale 6 chains to an inch.

With an inset of a cross-section of the division wall.

Middle division, Erie canal; map showing location of reservoirs, feeders and mechanical structures.  $33 \times 53$  inches.

Ass. doc. 1880, no. 88—Eng.

Ass. doc. 1888, no. 24—P.W.

" 1882, no. 13—P.W.

" 1894, no. 12—P.W.

" 1883, no. 9—P.W.

Scale 2 miles to an inch.

Profile of east end of the western division, showing the amount of water used in locking boats east.  $8 \times 23$  inches. (Ass. doc. 1880, no. 88—Eng.)

Sections showing present and proposed enlarged canal.  $11\frac{1}{2} \times 6\frac{1}{2}$  inches. (Ass. doc. 1880, no. 88—Eng.)

Sketch of proposed Bisby, Woodhull feeder. (Ass. doc. 1880, no. 88—Eng.)

Scale 10 chains to an inch.

Proposed reservoir at White lake. (Ass. doc. 1881, no. 28—Eng.)

Scale of map  $\frac{1}{4}$  of a mile to an inch.

Scale of profile of road, horizontal, 5 chains to an inch, vertical, 20 feet to an inch.

Scale of plan 4 feet to an inch.

Ralph R. Osgood's boom dredge adapted to the proposed enlargement of the Erie canal. (Ass. doc. 1881, no. 28—Eng.)

Cross-section and lengthwise view, each  $14 \times 7$  inches.

Western division of the Erie canal; map showing its reservoirs, feeders and mechanical structures.

Ass. doc. 1881, no. 28—Eng.

Ass. doc. 1888, no. 24—P.W.

" 1882, no. 13—P.W.

" 1894, no. 12—P.W.

" 1883, no. 9—P.W.

Scale of map 2 miles to an inch.

Scale of profile 4 miles to an inch longitudinally, and 100 feet to an inch vertically.

With insets of cities of Buffalo and Rochester, scale 3600 feet to an inch.

Standard sections, Erie canal, with slope walls,  $1\frac{1}{2} : 1$ , and with vertical walls. (Ass. doc. 1891, no. 66—Eng.)

Scale 20 feet to an inch.

Erie canal enlargement, 1896; diagram showing the level of Lake Erie at Buffalo from Mar. 1887, to Dec. 1895.  $9 \times 36$  inches. (Ass. doc. 1897, no. 73—Eng.)

Compiled from the records of the U. S. engineer's office, Buffalo.

To accompany report on the water-supply of the western division of the Erie canal.

Erie canal enlargement; map of a portion of the city of Lockport, showing the relation of the 18-mile creek to the Erie canal. (Ass. doc. 1897, no. 73—Eng.)

Scale about 1000 feet to an inch.

To accompany report on the water-supply of the western division.

Erie canal enlargement, map of the main water front of the city of Buffalo, showing the relation of the city sewerage system to the Erie canal, its slips, basins and branches, as well as the Buffalo and Black Rock harbors. (Ass. doc. 1897, no. 73—Eng.)

Scale about 750 feet to an inch.

Erie canal enlargement, 1896; map showing the original and present Oak Orchard feeder at Medina, taken from survey of 1873. (Ass. doc. 1897, no. 73—Eng.)

Scale 300 feet to an inch.

To accompany report on the water-supply of the western division.

Erie canal improvement, 1897, Cartersville waste-weir, contract no. 4. (Ass. doc. 1898, no. 67—Eng.)

Scale about 18 feet to an inch.

Erie canal enlargement; profile of proposed northern high-level route.  $7\frac{1}{2} \times 56$  inches. (Ass. doc. 1901, no. 54—Eng.)

Longitudinal scale about  $\frac{1}{2}$  of a mile to an inch, vertical scale about 45 feet to an inch.

Erie canal enlargement; profile of proposed southern high-level route.  $7\frac{1}{2} \times 50$  inches. (Ass. doc. 1901, no. 54—Eng.)

Longitudinal scale about  $\frac{1}{8}$  of a mile to an inch, vertical scale 50 feet to an inch.

Erie canal enlargement; profile of proposed Syracuse level extended.  $7\frac{1}{2} \times 66$  inches. (Ass. doc. 1901, no. 54—Eng.)

Longitudinal scale about  $\frac{1}{8}$  mile to an inch, vertical scale about 45 feet to an inch.

Erie canal enlargement; topographical map showing location of several possible new routes for Erie canal from Newark to Rome level.  $14 \times 53$  inches. (Ass. doc. 1901, no. 54—Eng.)

Scale about  $1\frac{1}{2}$  miles to an inch.

### Champlain Canal.

Map and profile of the Champlain canal as made from Lake Champlain to the Hudson river and survey thence to the tide at Waterford, by James Geddes, 1825.  $7\frac{1}{2} \times 19\frac{1}{2}$  inches. (see Laws in relation to the Erie and Champlain canals. 1825. v.2) 386 qN42

Longitudinal scale 3 miles to an inch, vertical scale 60 feet to an inch.

Also in maps of New York (912.747 v.15) and (912.7475 G26).

Map of the Champlain canal and its connections.  $13\frac{1}{2} \times 15$  inches. (Ass. doc. 1857, no. 60—Eng.)

Plan of a stone dam on Wood creek, Champlain canal.  $20 \times 27$  inches. (Ass. doc. 1867, no. 27—C.C.)

Map showing the connections of Champlain canal with the St. Lawrence, Ottawa, Rideau and Richelieu canals of Canada.  $7\frac{1}{2} \times 19\frac{1}{2}$  inches.

Ass. doc. 1869, no. 11—Eng.

1879, no. 41—Eng.

Scale about 20 miles to an inch.

Plan of aqueduct across Wood creek at Fort Edward.  $21\frac{1}{2} \times 33$  inches. (Ass. doc. 1870, no. 4—C.C.)

Map of the Champlain canal from its junction with the Erie canal at third lock, West Troy, to Whitehall; also profiles of the proposed ship canal from Whitehall to Fort Edward and of the Hudson river from Fort Edward to the Troy dam.  $18 \times 135$  inches. (Ass. doc. 1875, no. 80—Eng.)

Scale 40 chains, or 2,640 feet to an inch.

Map of the Champlain canal from its junction with the Erie canal at third lock, West Troy, to Whitehall, also the United States ship canal, as proposed from Whitehall to Fort Edward.

Ass. doc. 1875, no. 6—C.C.

Ass. doc. 1876, no. 27—Eng.

1875, no. 80—Eng.

Horizontal scale 40 chains to an inch, vertical scale 40 feet to an inch.

Profile of Champlain canal and Glens Falls feeder. (Ass. doc. 1889, no. 58—Eng.)

Horizontal scale 1 mile to an inch, vertical scale 40 feet to an inch.

Standard sections of the Champlain canal with slope walls  $1\frac{1}{2} : 1$  and with vertical walls. (Ass. doc. 1891, no. 66—Eng.)

Scale 20 feet to an inch.

Progress profile of the enlargement of the Champlain canal and the Glens Falls feeder.  $15 \times 68$  inches. Ass. doc. 1893, no. 35—Eng.)

Horizontal scale 2 miles to an inch, vertical scale 80 feet to an inch.

Profile of the Champlain canal, showing improved sections. (Ass. doc. 1895, no. 89—Eng.)

### Oswego Canal and River.

Map of the Oswego river with the route of the canal proposed on the west side.  $4 \times 12\frac{1}{2}$  inches. (see Laws in relation to the Erie and Champlain canals. 1825. v.1) 386 qN42

Scale 1 mile to an inch.

Plan of the high dam on the Oswego river. (Ass. doc. 1874, no. 6—C.C.)

Scale 40 feet to an inch.

Profile of the Oswego canal. (Ass. doc. 1889, no. 58—Eng.)

Horizontal scale 1 mile to an inch, vertical scale 40 feet to an inch.

Report of an enlarged canal via the Oswego route. (Ass. doc. 1896, no. 62—Eng.)

*Titles of maps and plans:*

1. Profile, size  $15 \times 108$  inches (in pocket of cover of volume).

2. Map of proposed location, size  $7\frac{1}{2} \times 21$  inches, scale 5 miles to an inch.

3. Standard sections in earth and in rock, size  $7 \times 13$  inches.

4. Map of proposed location near Cohoes, size  $7\frac{1}{2} \times 12$  inches, scale about 2500 feet to an inch.

5. Sections at Ilion and of Mohawk river at Stanwix, size  $7 \times 13\frac{1}{2}$  inches.

6. Map of proposed location at Little Falls, size  $7\frac{1}{2} \times 16$  inches, scale about 350 feet to an inch.

7. Cross-sections at dam sites, size  $15 \times 40$  inches.

**Cayuga and Seneca Canal.**

Profile of the Cayuga and Seneca canal. (Ass. doc. 1889, no. 58—Eng.)  
Horizontal scale 1 mile to an inch, vertical scale 40 feet to an inch.

**Black River Canal.**

Sketch of part of the Black river, showing a profile thereof with the cross-sections at the points as indicated. (Ass. doc. 1851, no. 45—Eng.)

Horizontal scale  $\frac{1}{2}$  mile, or 40 chains, to an inch, vertical scale 2 feet to an inch.

Statistical profile of the Black River canal and Erie canal feeder. (Ass. doc. 1851, no. 45—Eng.)

Scale  $1\frac{1}{2}$  miles to an inch.

Map showing location of reservoirs being constructed for Black River canal. 22×41 inches. (Ass. doc. 1856, no. 180—Eng.)

Scale 1 mile to an inch.

Profile of the Black River canal and Erie canal feeder. 8×49 inches. (Ass. doc. 1858, no. 15—Eng.)

Horizontal scale 1 mile to an inch, vertical scale 100 feet to an inch.

With an inset showing the location of the Black River canal.

Lakes and reservoirs, head waters Moose and Black rivers, showing present and proposed feeders to Black River canal. 15×21 inches.

Ass. doc. 1863, no. 50—Eng.

1868, no. 9—C.C.

Three illustrations of prism of canal with different slopes to walls. 8×11 inches. (Ass. doc. 1863, no. 50—Eng.)

Plan of a bulkhead for the North Branch reservoir. 21×26 inches. (Ass. doc. 1870; no. 4—O.C.)

Black river reservoirs, a sketch.  $7\frac{1}{2}$ ×13 inches. (Ass. doc. 1880, no. 88—Eng.)

Plan for cast-iron feed pipes, South Lake reservoir, Black River canal. (Ass. doc. 1880, no. 88—Eng.)

Scale 8 feet to an inch.

Chub lake dam, as found Sept. 6, 1881. 15×20 inches. (Ass. doc. 1889, no. 58—Eng.)

Scale 20 feet to an inch.

Black River canal with the water shed of the Black river, showing the location of the present reservoirs. About 25×29 inches. (Ass. doc. 1889, no. 58—Eng.)

Scale  $2\frac{1}{2}$  miles to an inch.

Profile of Black River canal and feeders and Black river improvement.  $17\frac{1}{2}$ ×88 inches. (Ass. doc. 1890, no. 62—Eng.)

Horizontal scale  $\frac{1}{2}$  of a mile to an inch, vertical scale 80 feet to an inch.

Map of the Forestport reservoir at the head of Forestport pond.  $8\frac{1}{2}$ ×16 inches. (Ass. doc. 1895, no. 89—Eng.)

Scale about  $\frac{1}{2}$  of a mile to an inch.

Plan of Forestport dam, with cross-section through spillway and a longitudinal section. (Ass. doc. 1895, no. 89—Eng.)

Scale of plan 10 feet to an inch, of cross-section 6 feet to an inch, of longitudinal section 30 feet to an inch.

Map of watershed supplying reservoirs in Adirondack forest, by D. E. Whitford, 1898.  $25\frac{1}{2}$ ×36 inches. (Ass. doc. 1899, no. 72.)

Scale  $2\frac{1}{2}$  miles to an inch.

Section of Black River canal; also section of Black River canal feeder, descent seven inches a mile. (Ass. doc. 1899, no. 72—Eng.)

**Shinnecock and Peconic Canal.**

Shinnecock and Peconic canal, Long Island; a sketch. 1p. (Ass. doc. 1895, no. 89—Eng.)

**Chenango Canal.**

Extension, Chenango canal from Binghamton to Pennsylvania state line. 11×33 $\frac{1}{2}$  inches.

Ass. doc. 1866, no. 9—C.C.

1866, no. 38—Eng.

Scale 1 mile to an inch.

Map of the Chenango canal extension, 1868. 8×34 inches.

Ass. doc. 1869, no. 11—Eng.

1870, no. 25—Eng.

Scale 1 mile to an inch.

## Genesee River.

Adjustment afforded by dams of various heights at location 1, Genesee river. (Ass. doc. 1891, no. 66—Eng.)

Map of a portion of the Genesee river south of Mount Morris. (Ass. doc. 1891, no. 66—Eng.)

Scale of map  $\frac{1}{4}$  of a mile to an inch.

Scale of sections 120 feet to an inch.

Horizontal scale of profile  $\frac{1}{4}$  of a mile to an inch, vertical scale of profile 100 feet to an inch.

Map showing borings for proposed dam across the Genesee river above Rochester, 1890. (Ass. doc. 1891, no. 66—Eng.)

Horizontal scale 20 feet to an inch, vertical scale 10 feet to an inch.

Relation between capacity of pond and height of dam on Genesee river above Mount Morris; also relation between capacity of pond and area flooded by dams in the same location. (Ass. doc. 1891, no. 66—Eng.)

Relation between rainfall in the Genesee watershed and flow of the river at Mount Morris, June 17 to Dec. 2, 1890. (Ass. doc. 1891, no. 66—Eng.)

Watershed of the Genesee river showing canals and feeders in use and abandoned, together with a portion of the Allegheny watershed. (Ass. doc. 1891, no. 66—Eng.)

Scale 3 miles to an inch.

Genesee river storage surveys. (Ass. doc. 1894, no. 21—Eng.)

1. Map of the vicinity of the dam site no. 2 and the hogback, showing the general location of dams proposed for those points, scale 200 feet to an inch.

2. Cross-sections at dam sites nos. 1 and 2, and the hogback location, showing outline elevations of proposed dams 130 feet high, scale 120 feet to an inch.

3. Section of masonry dam applicable to site no. 1, 130 feet high, scale about 16 feet to an inch.

4. Section of masonry dam applicable to site no. 2, 130 feet high, scale about 16 feet to an inch.

5. Section of masonry dam applicable to sites nos. 1 and 2, 58 feet high, scale about 16 feet to an inch.

6. General section of earth dam applicable to the hogback location, 130 feet in height, scale about 16 feet to an inch.

7. General section of earth dam applicable to the hogback location, 58 feet high, scale about 16 feet to an inch.

Diagram showing flow of Genesee river at Rochester, Mar., 1893, to Mar., 1894. (Ass. doc. 1895, no. 89—Eng.)

Two diagrams showing the relation of the flow of the Genesee river at Mount Morris and Rochester to the rainfall and temperature. (Ass. doc. 1895, no. 89—Eng.)

Genesee storage surveys, 1896. (Ass. doc. 1897, no. 73—Eng.)

Plate A. Topographical map of the proposed Portage reservoir, size  $5 \times 20\frac{1}{2}$  inches.

Plate B. Topographical map and profile of the changes in location of the Western New York and Pennsylvania railway, on account of proposed Portage reservoir, scale of map about  $\frac{1}{4}$  mile to an inch, scales of profile 1200 feet to an inch and 90 feet to an inch.

Plate C. Diagram showing the relation of the flow of the Genesee river at Mount Morris to the rainfall and mean temperature from Feb., 1895, to Nov., 1896, size  $9 \times 33$  inches.

Plate D. Topographical map of the site of the proposed Portage dam, size  $11 \times 19$  inches, scale about 200 feet to an inch.

Plate E. Proposed Portage dam, general plan, scale about 50 feet to an inch.

Plate F. Sectional plan of upper portion of Portage dam, scale about 50 feet to an inch.

Plate G. Plan of foundation of Portage dam, scale about 50 feet to an inch.

Plate H. Proposed Portage dam, vertical section at gate-house, scale about 20 feet to an inch.

Plate K. Weir dam at Mount Morris, scale of plan about 11 feet to an inch, of section  $2\frac{1}{2}$  feet to an inch.

Plate L. Flood flows of the Genesee river, size  $7 \times 10$  inches.

## Hudson River.

Topographical map of Hudson's river, with the channels, depth of water, rocks, shoals, etc. and the country adjacent, from Sandy Hook, New York, and bay, to Fort Edward; also, the communication with Canada by Lake George and Lake Champlain, as high as Fort Chambly on Sorel river, by C. J. Santhiere, engraved by William Faden, published Oct. 1, 1776, London. (N. Y. state library, maps, v.7 and 15) 912.747

Scale 4 miles to an inch.

Improvement of the Hudson river, showing plan and location of jetties built under act chap. 122, laws of 1863, together with those proposed to complete improvement, also the channel of 8 feet depth and over.  $15 \times 42$  inches. (Ass. doc. 1864, no. 179—Eng.)

Scale of map 2000 feet to an inch.

Scale of sections 1000 feet to an inch.

Map of the Hudson river from Troy to Fort Edward, showing the location of the proposed dams. 9×56 inches. (Ass. doc. 1868, no. 23—Eng.)

Map of head waters of Hudson and Raquette rivers, showing location of lakes and ponds with their watershed lines. (Ass. doc. 1875, do. 6—C.C.)  
Scale 2 miles to an inch.

Proposed plan for dams for head waters of Hudson and Raquette rivers. (Ass. doc. 1875, no. 6—C.C.)  
Scale 6 feet to an inch.

The Hudson river from Troy to New Baltimore, April, 1876. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 1800 feet to an inch.

New Baltimore bar, Nov., 1876. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 450 feet to an inch.

Old Overslaugh dam, July 1875. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 40 feet to an inch.

Overslaugh, Nov., 1876. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 450 feet to an inch.

Overslaugh bars, June, 1876. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 450 feet to an inch.

Survey of Fish House shoal, June, 1876. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 450 feet to an inch.

Survey of Washington and Van Buren bars, June, 1876. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 450 feet to an inch.

Troy survey from state dam to Cheeney's dock, July, 1876. 7×26½ inches. (Ass. doc. 1877, no. 50—Eng.)  
Scale about 105 feet to an inch.

Map showing proposed new bulkhead line and proposed rock cutting between state dam and Troy railroad bridge, Hudson river. About 12×19 inches. (Ass. doc. 1890, no. 62—Eng.)  
Scale about 200 feet to an inch.

Survey of the Troy dam, 1892-93. Ass. doc. 1894, no. 21—Eng.  
" 1895, no. 89—Eng.

Scale 40 feet to an inch.

Upper Hudson storage. (Ass. doc. 1896, no. 62—Eng.)

#### *Titles of maps:*

1. Map of the drainage area of the Hudson river above Glens Falls, showing the subdivisions of the same, size 12½×20 inches, scale 5 miles to an inch.
2. Four diagrams showing the relation of the flow of the Hudson river at Mechanicville to the rainfall and mean temperature from Oct., 1887, to Nov., 1895, inclusive.
3. Profile of the Hudson river from feeder dam at Glens Falls to North river village, surveyed 1895, horizontal scale 1000 feet to an inch, vertical scale 160 feet to an inch.
4. Map of the proposed Schroon valley reservoir, showing flow-line for a dam at Tumblehead falls 60 feet in height, size 14×24½ inches, scale 1½ miles to an inch.
5. Map of Indian lake flowage, scale ½ of a mile to an inch.
6. Map of Piseco lake, showing area to be flooded with storage developed to full capacity, scale ½ mile to an inch.

### Seneca River.

Stone dam across the Seneca river at Baldwinsville, 1893-95. (Ass. doc. 1895, no. 89—Eng.)  
Scale about 27 feet to an inch.

### Miscellaneous.

Map showing the improvement of the Allegheny river from Olean to Great Valley creek. 16½×18½ inches. (Ass. doc. 1864, no. 179—Eng.)

Map of Blue Mountain lakes. (Ass. doc. 1875, no. 6—C.C.)  
Scale 60 chains to an inch.

Map of Long, Forked, and Little Forked lakes, from surveys made July, 1874. (Ass. doc. 1875, no. 6—C.C.)  
Scale 4000 feet to an inch.

With an inset of map of Long lake and tributaries, scale 2 miles to an inch; also an inset of profile of canal between Long lake and head waters of the Hudson river.

Map of Chautauqua lake outlet. 9×19 inches. (Ass. doc. 1888, no. 25—Eng.)  
Scale for length 200 feet to an inch, for depth about 8 feet to an inch.

Map of Raquette lake, from surveys of A. P. Edwards. (Ass. doc. 1875, no. 6—C.C.)  
Scale 60 chains to an inch.



Plan for dredging at the foot of Canandaigua lake and for constructing breakwater, under chapter 192, laws of 1888. (Ass. doc. 1889, no. 58—Eng.)

Scale of map 100 feet to an inch.

Scale of profile 10 feet to an inch.

Scale of plan 2 feet to an inch.

Profile of Chub lake dams as found Sept. 6, 1881. (Ass. doc. 1889, no. 58—Eng.)

Scale 20 feet to an inch.

Sketch showing manner of rebuilding state dam across the Mohawk river at Cohoes, 1893-94. 1p. (Ass. doc. 1895, no. 80—Eng.)

### Plans of Bridges.

General plan for farm bridge on enlarged canal. 11×15 inches. (Ass. doc. 1852, no. 90—Eng.)

General plan for road bridge, Erie canal enlargement, size 16×22 inches; general plan of Whipple's patent arch truss bridge, 72 feet span, scale of plan and elevation 3 feet to an inch, scale of details 2 feet to an inch; general plan of Whipple's patent arch truss bridge, 100 feet span, scale of plan and elevation 5 feet to an inch, scale of details 2 feet to an inch; general plan iron road bridges, Whipple's trapezoidal truss, scale of plan and elevation 5 feet to an inch, scale of details 1 foot to an inch; general plan of road and farm bridge superstructures, with iron chords and shoes, 72 feet span, size 21×25 inches; general plan for farm bridge, lateral canals, 50 feet span, scale 4 feet to an inch; general plan of culverts, size 19×25 inches; general plan of farm bridge and abutments, span 72 feet, scale 5 feet to an inch. (see Engravings of plans, profiles and maps, compiled by S. H. Sweet, 1859. Plates B, D, E, F, I, L, O and P) 626 M6

Whipple's general plan of towing-path change bridge. 14×24½ inches. (Ass. doc. 1863, no. 50—Eng.)

Scale 4 feet to an inch.

General plan of wood bridge. 12½×20 inches. (Ass. doc. 1865, no. 20—Eng.)

Improved plan of wood bridge with iron chords. 16×28 inches. (Ass. doc. 1865, no. 20—Eng.)

Road bridge on White street, Cohoes, span between abutments 110 feet, roadway 17 feet, sidewalk 6 feet. 20×31 inches. (Ass. doc. 1868, no. 9—C.C.)

Scale 4 feet to an inch.

Plan of swing-bridge over Erie canal on Exchange street, Rochester. 22×34½ inches. (Ass. doc. 1870, no. 25—Eng.)

General plan of W. B. Cooper's wrought-iron arch truss bridge, span 72 feet. 21×34 inches. (Ass. doc. 1871, no. 6—C.C.)

Eastern division; plan of wrought-iron bridge. 18×22 inches. (Ass. doc. 1875, no. 80—Eng.)

Eastern division; plan of wrought-iron foot bridge. 26½×38½ inches. (Ass. doc. 1875, no. 80—Eng.)

Scale for plan and elevation 4 feet to an inch; for details 1 foot to an inch.

Plan of a lift-bridge over Champlain canal at Railroad street, Mechanicville, built in 1887. (Ass. doc. 1888, no. 25—Eng.)

4 sheets 13×18 inches each.

Clinton street bridge over the Erie canal at Syracuse; a plan. (Ass. doc. 1895, no. 80—Eng.)

Scale about 16 feet to an inch.

Longitudinal section of Exchange street bridge, Rochester. 6½×18 inches. (Ass. doc. 1899, no. 72—Eng.)

Standard highway bridge, Erie and Oswego canals, standard farm bridge, Erie and Oswego canals; standard highway bridge, Champlain canal; standard farm bridge, Champlain canal; standard lift-bridge, Erie canal. (see Maps and profiles accompanying the report of the State Engineer and Surveyor on the Barge canal, 1901. plates 16-20. 626 qQ1a

Plates 16-19, scale 8 feet to an inch.

Plate 20, scale about 4½ feet to an inch.

### Plans of Locks.

Cross-sections Black River canal locks. About 8½×11 inches. (Ass. doc. 1850, no. 45—C.C.)

General plan for timber locks, Chemung canal, scale 8 feet to an inch; general plan of enlarged double locks, 8 feet lift, scale 12 feet to an inch; general plan of composite locks on Chemung canal, scale 8 feet to an inch; Beardslee's plan of composite valve for enlarged locks, size 15×23 inches. (see Engravings of plans, profiles and maps, compiled by S. H. Sweet, 1859. Plates A, H, K and N.) 626 M6

Cross-sections of Black River lock and of enlarged lock. 4 figures,  $8 \times 9\frac{1}{2}$  inches. (Ass. doc. 1863, no. 50—Eng.)

Lock no. 17, eleven feet lift, for the Oswego canal.  $11\frac{1}{2} \times 16\frac{1}{2}$  inches. (Ass. doc. 1863, no. 50—Eng.)

Plan of weigh-lock at Waterford, Champlain canal.  $20 \times 28$  inches. (Ass. doc. 1863, no. 50—Eng.)

Plan of scales to weigh-lock, Waterford, Champlain canal.  $22\frac{1}{2} \times 30\frac{1}{2}$  inches. (Ass. doc. 1863, no. 50—Eng.)

Location of gunboat lock no. 1.  $18 \times 23$  inches. (Ass. doc. 1864, no. 179—Eng.)  
Scale 1 chain to an inch.

Locks nos. 13 and 14, Erie canal.  $18 \times 22$  inches. (Ass. doc. 1864, no. 179—Eng.)

Locks nos. 15 and 16, Erie canal.  $18 \times 22$  inches. (Ass. doc. 1864, no. 179—Eng.)

Locks nos. 17 and 18, Erie canal.  $18 \times 22$  inches. (Ass. doc. 1864, no. 179—Eng.)

Locks nos. 21 and 22, Erie canal.  $18 \times 22$  inches. (Ass. doc. 1864, no. 179—Eng.)

Locks nos. 37, 38 and 39, at Little Falls. About  $18 \times 44$  inches. (Ass. doc. 1864, no. 179—Eng.)

Map showing location of locks nos. 1, 2 and 3, Salina side-cut, Oswego canal.  $14 \times 23$  inches. (Ass. doc. 1864, no. 179—Eng.)  
Scale 4 chains to an inch.

Map showing location of one tier of new locks at Lockport, locks nos. 67, 68 and 69, in lieu of 67, 68, 69, 70 and 71. About  $13\frac{1}{2} \times 21$  inches. (Ass. doc. 1864, no. 179—Eng.)  
Scale 2 chains to an inch.

Map showing new proposed location of canal and locks at Lockville, locks nos. 57 and 58. About  $18 \times 28$  inches. (Ass. doc. 1864, no. 179—Eng.)  
Scale 2 chains to an inch.

Proposed gunboat locks as located outside and at head of present Erie canal locks.  $20 \times 30$  inches. (Ass. doc. 1864, no. 179—Eng.)  
Scale 12 feet to an inch.

Proposed plan of enlarging one of the Erie canal locks for gunboats. About  $18\frac{1}{2} \times 30$  inches. (Ass. doc. 1864, no. 179—Eng.)

Side-cut locks at West Troy.  $18 \times 23$  inches. (Ass. doc. 1864, no. 179—Eng.)

Scale 2 chains to an inch.

Plan of tumble-gate, lock no. 39, Erie canal.  $20 \times 28\frac{1}{2}$  inches. Ass. doc. 1866, no. 3—Eng.  
" 1866, no. 9—C.C.

Scales 2 and 4 feet to an inch.

Plan of enlarged lock with tumble-gate, lift 9 feet, Champlain canal.  $18 \times 30$  inches. (Ass. doc. 1867, no. 7—C.C.)

Plan of lock on Black river above Beach's bridge.  $20 \times 31$  inches. (Ass. doc. 1868, no. 9—C.C.)

Scale 8 feet to an inch.

Plan of tree-dam connected with lock on Black river above Beach's bridge.  $25-42$  inches. (Ass. doc. 1868, no. 9—C.C.)

Scale 8 feet to an inch.

Plan of boiler-plate valve for lock-gates.  $6 \times 12$  inches. (Ass. doc. 1871, no. 19—Eng.)

Plan of machinery for operating Heath's valves and tumble-gate for enlarged locks, Erie canal.  $23\frac{1}{2} \times 36$  inches. Ass. doc. 1871, no. 6—C.C.

" 1871, no. 19—Eng.

Scale  $\frac{1}{2}$  full size.

Plan of stop-gate.  $21 \times 34$  inches. Ass. doc. 1871, no. 6—C.C.

" 1871, no. 19—Eng.

Sketch of proposed apparatus for maneuvering lock-gates and valves by water-power, designed by E. Sweet, jr., 1879.  $13\frac{1}{2} \times 39$  inches. (Ass. doc. 1879, no. 41—Eng.)

Device for drawing loaded boats into lock no. 52, in successful operation during 1880.  $23 \times 36$  inches. (Ass. doc. 1881, no. 28—Eng.)

Scale 4 feet to an inch.

Plan for lengthening at the foot of lock no. 46, Erie canal. (Ass. doc. 1888, no. 25—Eng.)

Scale 6 feet to an inch.

Map of the Erie canal, Lockville; proposed new canal and combined lock. (Ass. doc. 1891, no. 66—Eng.)

Scale 100 feet to an inch.

Profile of front angle of proposed canal, Lockville, for combined lock. 1 plate. (Ass. doc. 1891, no. 66—Eng.)

Horizontal scale 100 feet to an inch; vertical scale 20 feet to an inch.

Plan of lock no. 41, Erie canal, as enlarged in 1891. 12½×32 inches. (Ass. doc. 1892, no. 75—Eng.)

Scale 15 feet to an inch.

Profile of the Erie canal, showing lengthened locks, 1894. (Ass. doc. 1895, no. 89—Eng.)

Standard lock for Erie and Oswego canals; standard lock for Champlain canal; flight of locks at Cohoes, plan of wiring system of locks, and lower lock-gate for 20 ft. lift. (see Maps and profiles accompanying the report of the State Engineer and Surveyor on the Barge canal. 1901. Plates 22–25) 626 qQ1a

Plates 22–24, scale about 13½ feet to an inch.

Plate 24, scales 1½, 2½ and 12 feet to an inch.

Plate 25, scale 1 foot to an inch.

### Plans of Canal-Boats, Engines, etc.

Diagrams showing the comparative size of the boats used on the Erie canal and those to be used on the enlargement of the Erie canal. (Ass. doc. 1851, no. 45—Eng.)

Scale 6 feet to an inch.

Plan of the Baxter steam canal-boats, patented Sept. 15, 1874. (Ass. doc. 1875, no. 80—Eng.)

Cable towboat with vertical pulley, and movable guide pulleys—fifteen horse-power—J. Fowler and company. (Ass. doc. 1878, no. 9—Eng.)

Scale 1 to 200.

Fowler clip pulley; elevation, plan and section. 1 plate. (Ass. doc. 1878, no. 9—Eng.)

Illustration of Frick's method of coupling canal-boats, forming "double headers." Folded plate. (Ass. doc. 1878, no. 9—Eng.)

W. Baxter and W. Baxter, jr. Steam canal-boats, patented Sept. 15, 1874. Folded plate.

Ass. doc. 1878, no. 9—Eng.

" 1892, no. 75—Eng.

Sections of steam "consort" barge, running on the Erie canal in 1891. (Ass. doc. 1892, no. 75—Eng.)

Scale about 7 feet to an inch.

Simple condensing marine engine, 14×16 inches, and horizontal boiler, as applied to steam canal-boats by Gordon W. Hall. (Ass. doc. 1892, no. 75—Eng.)

Scale about 2½ feet to an inch.

Simple condensing marine engine, 14"×16", built by Norman and Evans, 1891. (Ass. doc. 1892, no. 75—Eng.)

Scale ¾ of a foot to an inch.

Steeple compound marine engine, 10" and 18"×14", 1891. Ass. doc. 1892, no. 75—Eng.)

Scale ¾ of a foot to an inch.

Vertical magazine boiler with shaking grate, as applied to steam canal-boats by G. W. Hall, Lockport, 1891. (Ass. doc. 1892, no. 75—Eng.)

Scale nearly 2½ feet to an inch.

Milligan electric system for canal-boat propulsion, three one-page half-tones explaining system. (Ass. doc. 1895, no. 89—Eng.)

Milligan electric towing system; details of track construction. 1 plate. (Ass. doc. 1895, no. 89—Eng.)

Milligan system of electrical towing; sketch in operation. 1 plate. (Ass. doc. 1895, no. 89—Eng.)

Standard plan of steel bulkhead, New York state canals. (Ass. doc. 1895, no. 89—Eng.)

Scale 2½ feet to an inch.

Beyer's propelling apparatus for vessels. 3 plates with 5 figures. (Ass. doc. 1898, no. 62—Eng.)

Lamb electrical towing system: (1) Boat with officials being towed by motor, Oct. 26, 1895; (2) Showing descent of cable under a bridge; (3) Motor, cable and supports. plates. (Ass. doc. 1896, no. 62—Eng.)

Removable and vertically adjustable electrical propelling apparatus for canal-boats. 7 plates with 21 figures. (Ass. doc. 1896, no. 62—Eng.)

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**PART FOUR**

**CANALS OF THE UNITED STATES  
AND CANADA**

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1367



## CHAPTER I.—HISTORICAL SKETCHES.

### THE CANALS OF THE UNITED STATES.

#### STATE AND CORPORATION CANALS.

##### INTRODUCTION.

The information to be obtained concerning the various canals of North America is somewhat meagre and a satisfactory compilation is extremely difficult. The most complete document on this subject is the report of H. Vétillart to the French Minister of Public Works. This report, entitled *La Navigation aux États-Unis*, has been used in preparing the present work, but considerable original research has been made also. Probably errors will be found in these sketches and tables; concerning New York canals it is known that different official records vary so widely as to make certainty of statement often impossible, and doubtless this is true of other waterways.

A number of short canals, without locks, have been purposely omitted. Among the canalized rivers only those are given in which the improvements comprise something more than mere betterment of channel by means of dredging and snagging. Naturally the line drawn between canals and canalized rivers cannot be altogether satisfactory; some of the canalized rivers will be seen to embrace in their extent canals of considerable length. The ton of two thousand pounds is used throughout this chapter, unless otherwise stated.

The following persons have kindly furnished information to be used in this compilation: Frank W. Hodgdon, Chief Engineer of Massachusetts; Leon McDonald, Superintendent of Canal Commissioners, Ill.; C. L. Nicholson, Secretary of the Chesapeake and Delaware Canal Company; W. G. Johnston, President of the Board of Public Works of Ohio; Frank M. Kerr, Chief State Engineer, Louisiana; G. B. Nicolson, Engineer and General Manager of the Chesapeake and Ohio Canal Company; Dr. E. L. Corthell, Advisory Board of Consulting Engineers, New York State canals; Professor L. M. Haupt, Consulting Engineer, Philadelphia, Pa.

The following is a partial list of the books consulted on this subject: *Internal Navigation of the United States*, George Armroyd; *The Great American Canals*, Archer Butler Hulbert;

*Waterways and Water Transport in Different Countries*, J. S. Jeans; *History of the Sault Ste. Marie Canal*, D. H. Kelton; *Map of the Railroads of the United States and Canada*, D. K. Minor; *Compendium of the Internal Improvements of the United States*, Mitchell; *The Canals and Railroads of the United States*, H. S. Tanner; *Transportation Systems in the United States*, J. L. Ringwalt; *History of the Canals and Railroads of the United States*, H. V. Poor; the report on Water Transportation of the United States census reports of 1880 and 1890; the reports of Chief of Engineers of the U. S. Army to date; reports of various corporations and of State officials; articles appearing in the following publications: *Engineering News*, *Engineering and Building Record*, *Scientific American*, and others.

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#### CUMBERLAND AND OXFORD CANAL.—1.\*

This canal, constructed under a charter granted in 1820, was designed to establish communication between Portland and Sebago pond, together with the connecting waters.

One lock in Songo river opened a waterway from Sebago river into the upper lakes and together with the canal, established a through water route from Harrison and Bridgeton to Portland.

Although badly constructed the canal did a profitable business until the opening of the Portland and Ogdensburg railroad, soon after which the canal was abandoned. The canalization of the Songo river was kept in operation by the State of Maine at last reports.

In 1833 the net profits on this canal amounted to \$12,000.

#### THE CANALS OF NEW HAMPSHIRE.—2, 3, 4, 5 and 6.

The canals of New Hampshire were constructed between the years 1812 and 1837 and were designed to furnish a means of getting around the falls of the Merrimac and to render the river navigable.

These canals together with the canal at Lowell, Mass., around the Pawtucket falls made the Merrimac navigable from Concord, N. H., to the sea, for boats drawing three and one-half feet of water. This whole distance is more than one hundred miles.

#### PAWTUCKET FALLS CANAL.—7.

This canal was constructed by a company incorporated in 1792 under the name of, "The Proprietors of the Locks and Canals of the Merrimac River." The canal was built in order to enable boats to get around the falls of the Merrimac, called the Pawtucket falls at Lowell.

\*Reference number. A corresponding number is given in Chapter II—Tabular Statistics—and on the accompanying map, found in pocket at cover.

This canal eventually became a distributing canal for water-power. It ceased to be used as a waterway to any great extent after the building of the Middlesex canal.

#### MIDDLESEX CANAL. - 8.

This canal was constructed by the Middlesex Canal Company, incorporated in 1793, and was designed to unite the Merrimac above Pawtucket falls with Boston harbor.

It left the Merrimac about one mile above Pawtucket falls and from thence ascended to its summit at Billerica. From that point it descended to the Charles river, which empties into Boston harbor. The canal summit level was fed from the Concord river.

The canal opened as far as Woburn in 1804; was completed and fully opened to traffic in 1808.

In 1810 the tolls on the canal, fixed at one-sixteenth of a dollar per mile, yielded a revenue of \$15,000, and in 1836, \$30,000. The revenues of the company continued to increase until 1835, when the Boston and Lowell railroad was built. From this time on the receipts from the canal tolls decreased steadily till in 1853 they ceased entirely. Six years later the rights of the company were forfeited and the rights of soil reverted to the original owners. During the most prosperous parts of this canal's history, the stockholders received an annual dividend of six per cent.

#### *Statistical Statement.*

Year.	Receipts from tolls.
1808 . . . . .	\$7,000
1811 . . . . .	17,000
1815 . . . . .	25,000
1820 . . . . .	14,000
1825 . . . . .	30,000

#### CAPE COD SHIP CANAL - 8½.

As early as 1676 the necessity of building a canal across Cape Cod from Buzzards bay to Barnstable bay was appreciated by the colonists, but no action in the matter was taken until 1697, when it became a subject of such interest that the General Court of the Colony of Massachusetts discussed the advisability of undertaking the work. The matter was referred to a committee, which, however, did nothing with the project, and it was about seventy years before the question was again brought before the public.



During the interim private parties became interested in the undertaking and a short time before the signing of the Declaration of Independence a surveyor was employed to examine the route for the proposed canal, but, owing to the Revolutionary war and the consequent reorganization of the Government, consideration of the project was given up and it was not until the year 1824 that it appeared again. At this time the question was brought before Congress, but again nothing was done.

During the several times that the question of building this canal was before the different legislative bodies up to 1860, it was evident that the importance and necessity of such a waterway was not fully appreciated; although first projected in 1676, it was not until just prior to the Civil war that there seemed to be any possibility of the passage of an act to accomplish the object so long sought by the people of Massachusetts and the marine interests. However, the outbreak of war again blasted the efforts, when the outlook seemed bright for success.

Not until 1885 was anything done towards building this channel and in that year about one mile of canal was constructed, but this is all that has been done towards its completion. As projected the canal is to be eight miles long, to be built without locks and is estimated to cost about \$6,000,000.

The building of this waterway will save about 75 and 145 miles, respectively, in distance over the present "inside" and "outside" routes between New York and Boston, which are more or less dangerous at all times. About 40,000 vessels round Cape Cod annually, bearing cargoes of some 20,000,000 tons. It is supposed that the construction of this canal would increase this traffic by the large amount that now goes by part water and part rail routes.

#### BLACKSTONE CANAL. — 9.

Two distinct companies were incorporated in 1823 by the Legislatures of Massachusetts and Rhode Island respectively, for the construction of a canal from Worcester, Mass., to Providence, R. I.

These two companies were merged in 1825 under the name of "The Blackstone Canal Company." The construction of the canal was begun in Rhode Island in 1824 and in 1826 the work was started in Massachusetts.

The first boat passed through the entire length of the canal in 1828. The construction up to this time had cost \$750,000. Of this total, \$500,000 was subscribed by citizens of Massachusetts and the remaining \$250,000 by citizens of Rhode Island.

The receipts from tolls reached their maximum in 1832, amounting to \$18,907. The canal was never profitable to the owners.

The canal was deficient in an adequate water-supply and was often visited by injurious floods. It was also out of service during the winter months on account of the severity of the climate in this section. In spite of these disadvantages and its failure to make a commercial success, the canal conferred vast benefits on the region traversed and was not abandoned until 1848.

Its abandonment at this date was the direct result of the building, in 1847, of the Providence and Worcester railroad, with which the canal was unable to compete.

FARMINGTON CANAL. — 10.

HAMPSHIRE AND HAMPDEN CANAL. — 11.

NEW HAVEN AND NORTHAMPTON CANAL. — 10, 11.

The Farmington canal received its charter from the State of Connecticut in 1822. It was begun in 1825 and opened in 1828 as far as Farmington. Soon after this, it was prolonged to Southwick on the northern boundary of the state.

The Hampshire and Hampden canal was the extension of the Farmington canal in the State of Massachusetts. Authorized in 1823, it was completed in 1829, as far as Westfield from Southwick, on the state's southern boundary. In 1835 the canal was completed to Northampton.

The Farmington canal and the Hampshire and Hampden canal, although owned by separate companies, formed practically one canal, furnishing a continuous waterway from Northampton, Mass., to New Haven, Conn., on Long Island Sound.

In 1836 these canals suffered heavy damage and both companies, equally involved, sold out to a new company, called the New Haven and Northampton Canal Company, which thus put this whole system under one control.

The traffic on these canals was of considerable importance and from 1830 to 1836 the annual receipts were as large as \$75,000. The expense of operating was so large, however, and the repairs were so numerous that the canal was never a paying one.

In 1836, when these properties were taken over by the New Haven and Northampton Canal Company, the new company agreed to take up the indebtedness only, of the old companies, paying nothing whatever for the capital stock, which thus became a total loss. The amount of stock issued by the Farmington Canal Company was \$537,195, and by the Hampshire and Hampden Canal Company, \$269,000, making a total loss up to 1836 of \$806,195 to the stockholders of these two companies. The canal

was operated with twenty to twenty-five-ton boats till 1845 when it was replaced by a railroad. At this date, 1845, the total loss on the canal system was reckoned at \$1,089,425.

THE CANALS OF NEW YORK STATE—Nos. 18 TO 33, INCLUSIVE.

For a complete account of the canals of New York State, see Part One, their map numbers only being given here.

Erie Canal.—18.

Champlain Canal.—19.

Oswego Canal.—20.

Oneida River Improvement.—21.

Baldwinsville Canal and Seneca River Towing-path.—22.

Cayuga and Seneca Canal.—23.

Black River Canal.—24. (Including Black River Improvement.—25.)

Chemung Canal.—26.

Crooked Lake Canal.—27.

Oneida Lake Canal.—28.

Chenango Canal.—29.

Chenango Canal Extension.—30.

Genesee Valley Canal.—31.

Shinnecock and Peconic Canal.—31A.

Delaware and Hudson Canal.—32.

Junction Canal.—33.

THE MORRIS CANAL.—34.

The Morris Canal and Banking Company was chartered in 1824 by the State of New Jersey and authorized to construct a canal from the Delaware river to Newark. The extension from Newark to Jersey City was authorized in 1828. The canal was opened in 1831 as far as Newark and was completed to Jersey City in 1836.

The summit of the canal near Stanhope is fifty-one miles from Newark and thirty-nine miles from Phillipsburg. It is nine hundred and fourteen feet above the Hudson and seven hundred and sixty above the Delaware. The height of nine hundred and fourteen feet is surmounted by means of twelve inclined planes lifting seven hundred and fifty-eight feet and sixteen locks lifting one hundred and fifty-six feet.

The descent to the Delaware of seven hundred and sixty feet is accomplished by means of eleven inclined planes of six hundred and ninety-one feet total lift and seven locks of forty-nine feet total lift.

The canal was built originally with a prism of small dimensions, 32 x 20 x 4.

The planes and locks were enlarged in the year 1841, but immediately after this enlargement the company failed and the management of its affairs was put in the hands of receivers. The receivers leased the canal until 1844.

In 1844 the canal was bought under a plan for reorganization by the Morris Canal and Banking Company of 1844, (capital \$1,000,000.)

In 1844-5 this company undertook the enlargement of the locks and prism. The prism was enlarged by them to the dimensions, 40 x 25 x 5. Section boats were also introduced at this time and were capable of carrying forty-four tons of twenty-two hundred and forty pounds.

Between the years 1847 and 1860 all the planes were rebuilt and equipped with wire-rope hoists. At the end of these improvements, in 1860, the canal was capable of conveying boats of sixty tons capacity.

Beside its twenty-three lift-locks, already enumerated, this canal has four guard-locks, one feeder-lock and two tide-locks. The greatest lift of any one lock is twelve feet.

The inclined planes on this canal vary in slope from eight on one to eleven on one, and are practically boat railways, conveying the boats in timber cradles up an inclined track by means of cable hoists operated by water-power.

The boats, in order to facilitate their passage over the inclined planes, are constructed in two sections and are jointed together by latches and steadying pins. The trucks, like the boats, are built in two sections and are heavy timber cradles, supported on eight wheels and running on tracks that extend at the foot of each incline a short distance along the bottom of the canal prism. The tracks descend again to the bottom of the summit level and extend a short distance along the bottom. The boats are floated into these trucks in one level and are floated out again in the next level. The trucks are hauled up the steep inclines by wire ropes, wound on drums operated by water-power and descend by their own weight.

This canal has a total length from Phillipsburg to Jersey City of 102.38 miles, and in addition to this, two feeders. The Lake Hopatcong feeder in Morris county has a length of 0.5 mile and the Pompton feeder in Passaic county a length of 3.6 miles, making in all 106.48 miles of canal.

The original cost of this canal was \$2,830,000, and the total cost including all enlargements up to 1860 was \$5,100,000.

The canal was leased in 1871 to the Lehigh Valley R. R. Co. for nine hundred and ninety-nine years under a guarantee of ten per cent dividends on preferred stock and four per cent on the common stock.

The tonnage on this canal had decreased to such an extent that in 1904 a committee of the New Jersey Legislature reported in favor of allowing its abandonment. The Legislature, however, has failed to act on this report to the present time.

From 1880 to 1890 the average amount of coal transported on this canal was about 285,000 tons. The amount carried in each of the ten years previous to 1903 is shown below.

*Statement of Operations.*

Date.	TONS OF FREIGHT.		Tolls.	Expenses of operation.	Net earnings.
	Total.	Coal only.			
1845.....	58,259	.....	\$18,997	.....	.....
1845-59a.....	366,537	.....	172,331	\$85,071	\$87,260
1860.....	707,631	.....	350,710	.....	.....
1865.....	716,587	.....	800,584	272,864	327,720
1870.....	707,572	.....	291,549	.....	.....
1875.....	451,045	.....	270,216	.....	.....
1880.....	503,486	.....	215,667	160,418	55,259
1889.....	462,626	.....	335,240	301,635	33,605
1890.....	394,432	.....	.....	.....	.....
1893.....	.....	229,509	.....	.....	.....
1894.....	.....	290,713	.....	.....	.....
1895.....	270,931	256,590	.....	.....	.....
1896.....	.....	203,807	.....	.....	.....
1897.....	.....	211,616	.....	.....	.....
1898.....	.....	164,757	.....	.....	.....
1899.....	.....	156,047	.....	.....	.....
1900.....	125,829	117,998	.....	.....	.....
1901.....	.....	119,005	.....	.....	.....
1902.....	.....	90,606	.....	.....	.....
1903.....	.....	.....	56,564	.....	.....

a = Average.

DELAWARE AND RARITAN CANAL. - 35.

The Delaware and Raritan Canal Company and the Camden and Amboy Railroad Company received their charters in 1830 and were consolidated in 1831. The company resulting from this consolidation constructed the canal and operated it until 1867, when it united with the New Jersey Railroad Company.

This new company took the name of the United New Jersey Railroad and Canal Company and is still the real owner of the canal.

In May, 1871, however, the canal was leased to the Pennsylvania Railroad Company for nine hundred and ninety-nine years, and since that date it has been operated by that road. The Pennsylvania Railroad engages to pay ten per cent per annum on the total stock of the united companies.

The canal is well built throughout with paved banks, swing bridges and steam operated lock-gates. The bridges also near the locks are operated by steam and steam is used to tow the boats through the locks. The whole plan is to allow high speed and quick lockages.

While the canal is designed to allow the passage of boats carrying six hundred tons, experience has shown that it is more advantageous to employ boats carrying not more than four hundred and fifty tons. The length of boats should not be greater than one hundred and ten feet and the width not greater than twenty-three feet.

The feeder is navigable, but only for smaller boats.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenses for operation and maintenance.	Net earnings.
1867.....	2,404,688	\$871,672	\$328,515	\$543,157
1868.....	2,519,285	912,108	325,561	586,547
1869.....	2,547,212	1,035,361	303,008	732,353
1870.....	.....	888,353	303,349	585,004
1871.....	.....	1,913,459	701,030	1,212,429
1872.....	.....	1,524,605	1,016,037	508,568
1873.....	.....	1,590,100	883,321	706,779
1874.....	2,308,671	1,320,519	768,417	552,102
1875.....	1,958,004	1,067,661	541,036	526,625
1876.....	1,897,708	882,551	523,306	359,245
1877.....	.....	896,570	477,607	418,963
1878.....	1,524,530	702,083	389,720	312,363
1879.....	2,103,510	695,959	326,925	369,034
1880.....	1,348,082	419,430	331,343	88,087
1881.....	1,710,888	541,077	232,314	308,763
1882.....	1,669,044	553,418	294,750	258,668
1883.....	1,694,884	548,055	291,575	256,480
1884.....	.....	547,711	381,494	166,307
1885.....	.....	529,079	342,374	186,705
1886.....	.....	533,526	390,705	142,821
1887.....	.....	494,219	414,159	80,060
1888.....	.....	525,748	430,680	95,069
1889.....	1,276,269	518,907	418,940	99,967
1890.....	.....	509,193	415,326	94,837
1891.....	.....	400,174	363,225	36,949
1892.....	.....	959,307	358,337	970
1893.....	.....	317,141	333,471	d14,330
1894.....	.....	287,640	300,323	d12,083
1895.....	.....	274,438	308,865	d34,427
1896.....	.....	260,882	292,845	d31,963
1897.....	.....	237,298	275,270	d37,972
1898.....	.....	259,142	297,720	d38,578
1899.....	.....	285,068	343,501	d58,433
1900.....	.....	296,871	331,805	d34,934
1901.....	.....	272,753	331,949	d58,896
1902.....	.....	334,067	384,768	d50,701
1903.....	.....	293,963	406,276	d112,313
1904.....	.....	275,267	378,475	d103,218

d = Deficit.

THE PENNSYLVANIA CANALS. — 37, 38, 39, 40, 41, 42, 43, 44, 45, 46.

The State of Pennsylvania began the consideration of a canal system traversing the State from the east to the west in the latter part of the eighteenth century, but nothing was accomplished until 1824. In that year a commission was appointed to investigate the possible canal routes between Harrisburg and Pittsburg. The following year another commission was appointed to make surveys and estimates for a canal system extending from Philadelphia to Pittsburg, from Allegheny to Erie, and also for a line to extend to the northern boundary of the State, with a view to connecting with the New York State canals.

The work of construction was begun in 1826 and continued until about 1840 without interruption. During the year 1827 the construction of the Juniata canal as far as Lewiston was authorized and the construction of the western division as far as Blairsville was ordered; also the construction of the Susquehanna division to Northumberland. By the same act construction of the French creek feeder was ordered and the examination of a canal route up the valley of the Delaware from Bristol. Provisional authorization for this construction was also given.

In 1828 the extension of the canal on the Susquehanna from the mouth of the Swatara to Columbia was authorized, also the extension of the Juniata division to Hollidaysburg. By the same act the extension of the canal from Northumberland to Bald Eagle creek was authorized and of the Delaware valley canal as far as Easton. The construction of the Allegheny Portage railroad, designed to form a connecting link between the canals east and west of the Allegheny mountains, was authorized also at this time.

The work undertaken by the State in these various canals and railroads was much more expensive than previously estimated, and the debt accumulated rapidly. Much of the work was poorly done, although some of it merited the highest praise. As a whole, however, the construction of these canals was scandalously mismanaged.

The dissatisfaction of the people, when they began to realize the enormous burden of the debt that they had taken upon themselves, was intense. Retrenchment was necessitated by the attitude of the people toward further expenditures, and in 1840 the work of construction was entirely stopped.

The work at this time was not complete, but the success of the competing railroads was already assured, and the people of the state wholly out of sympathy with further expenditures for canals.

The canals and railroads built by the State at such vast expense were no doubt successful in part. The vastness of the enterprise so hastily undertaken resulted in much that was unproductive. Parts of the canal system never paid the annual charges for repairs and operation, and disappointment with the entire scheme became general.

As a result of the popular discontent, the sale of the State works to private corporations was begun in 1845 and was completed in 1859.

In 1845 the Erie canal was sold to the Erie Canal Company. In 1857 the main line of the canal was sold to the Pennsylvania Railroad Company for \$7,500,000 in bonds. In 1858 the lateral canals were sold to the Sunbury and Erie Railroad Company for \$3,500,000.

The Sunbury and Erie Company afterwards sold the several canals as follows:

The North Branch divisions to the North Branch Canal Company for \$1,600,000; West Branch and Susquehanna division to the West Branch and Susquehanna Canal Company for \$500,000; the Delaware division to the Delaware Division Company for \$1,775,000.

In 1863 the North Branch Canal Company sold that part of the canal between Northumberland and Wilkesbarre to the Wyoming Canal Company for \$1,010,000. In 1865 the name of the North Branch Canal Company was changed by legislative enactment to the Pennsylvania and New York Canal and Railroad Company. The privilege of constructing a railroad along the berme bank of the canal was granted by the same act.

This railroad did not injure the canal nor interfere with its operation, but the canal was practically destroyed by a flood in 1865, and repairs were never completed. The railroad was opened to traffic in 1869.

The Wiconisco canal was transferred to a private company while still incomplete, having cost the State about \$1,500,000.

By the terms of sale to the Pennsylvania railroad, in 1857, that corporation acquired the Eastern division, the Juniata division, the Western division and the Allegheny Portage railroad. The railroad company gave in payment for these properties bonds to the value of \$7,500,000, bearing five per cent interest and payable in annual instalments. These instalments were so planned that the entire bond issue would be finally retired in 1893.

In the first year of its ownership the railroad company abandoned the Allegheny Portage railroad. In 1863 about thirty miles of the Western division was abandoned, extending from Blairsville to Johnstown, and in 1864 the remainder of this division was abandoned.

In 1866 the Pennsylvania Railroad Company sold to the Pennsylvania Canal Company that part of its canal property that was not abandoned, amounting to one hundred and seventy-eight miles. The consideration was \$2,750,000, and of this amount \$1,000,000 was reckoned as being the value of the canals when first purchased by the railroad in 1857. The companies' reports seem to show that this sale was made to avoid further payments to the State, and that the State received only this sum, \$1,000,000, instead of \$7,500,000 as at first agreed.

The Pennsylvania Canal Company acquired a majority of the shares of the West Branch Canal Company in 1867, and operated the canals of that company (Susquehanna and West Branch



canal) under a lease after 1869. The Wyoming Canal Company was absorbed by the Pennsylvania Canal Company in 1869. In 1870 the property of the Wiconisco Canal Company was obtained as a result of a judgment, and thereafter all these canals were operated as a single property. In 1870 the canals of the Erie Canal Company were acquired by forced sale by the Pennsylvania Company and were operated through the season of 1871, when they were abandoned.

In 1872 the canals in operation under the control of the Pennsylvania Canal Company were reported as follows:

Columbia-Wilkesbarre .....	151 miles
Junction-Williamsburg .....	113 miles
Northumberland-Farandsville . . . . .	82 miles
Clarks Ferry-Millersburg .....	12 miles
Total .....	358 miles

The prism was 40 to 60 feet at water-surface, 24-34 at bottom and from 4 to 6¼ feet deep.

The locks were as follows:

Cut stone .....	61
Wood and rubble.....	46
Wood.....	25
Total.....	132

Besides these lift-locks there were fourteen stop-locks, sixteen guard-locks, and four weigh-locks. There were, on the entire system, twenty-six dams, sixty-eight aqueducts, and eighteen miles of slack water. At this date the average capacity of the boats was one hundred and twenty tons each, and the average tonnage on the canals was a little less than one million tons yearly.

The canals of the western division were entirely abandoned in 1865 and after 1872 the number of miles operated decreased steadily. In 1875 the canal mileage of this system had decreased to three hundred and thirty-eight miles. In 1885 there were only three hundred and twenty-four miles of canal in operation and in 1890 only one hundred and forty-four miles. Again, in 1901, all except one hundred and one-half miles of the canals of this system were abandoned. In 1903 only forty-three miles remained and in 1904, this great system of Pennsylvania canals was wholly abandoned. The Delaware Division canal which is not included in the above system, but which is under the control of the Lehigh Coal and Navigation Company, remains to-day a sole representative of the original system of State canals.

*Statement of Operations of the Pennsylvania Canal Co. from  
1871 to 1900.*

Date.	Tons of freight.	Receipts.	Expenses for maintenance and operation.	Net earnings.
1871.....	1,029,286	\$649,598	\$591,711	\$57,887
1872.....	967,574	556,164	696,598	d140,434
1873.....	870,121	559,557	706,788	d147,231
1874.....	871,358	555,524	249,859	305,665
1875.....	781,707	444,669	240,637	204,032
1876.....	880,652	409,773	238,944	170,829
1877.....	772,189	299,654	152,221	147,433
1878.....	668,706	289,009	151,698	137,311
1879.....	806,522	282,767	174,843	107,924
1880.....	861,798	368,770	177,826	190,944
1881.....	905,095	360,251	262,611	97,640
1882.....	874,952	371,467	253,740	117,727
1883.....	808,311	388,389	203,772	184,617
1884.....	649,517	315,763	192,373	123,390
1885.....	624,021	307,590	145,441	162,149
1886.....	670,641	280,314	201,845	78,469
1887.....	687,461	297,707	366,871	d69,164
1888.....	712,089	325,928	406,173	d80,145
1889.....	410,904	172,342	228,809	d56,467
1890.....	.....	135,029	99,413	35,616
1891.....	377,878	129,500	102,372	27,128
1892.....	340,771	102,796	100,160	2,636
1893.....	302,868	109,741	156,426	d46,685
1894.....	267,057	86,779	85,430	1,349
1895.....	286,659	58,412	68,517	d10,105
1896.....	.....	68,531	58,379	10,152
1897.....	.....	44,853	37,171	7,682
1898.....	.....	75,721	90,359	d14,638
1899.....	.....	33,089	35,408	d2,319
1900.....	.....	33,325	31,384	1,941

Abandoned in the year 1904. d = Deficit.

DELAWARE DIVISION CANAL. — 47.

This canal was sold in 1858 by the State of Pennsylvania to the Sunbury and Erie Railroad Company and it has since been re-sold to the Delaware Division Canal Company.

This latter company leased the canal in 1866 to the Lehigh Coal and Navigation Company, receiving eight per cent on the stock, \$1,633,350 and six per cent on the bonds, \$800,000.

The canal, since the lease, has been used mainly for the transportation of the coal of the Lehigh company.

Constructed originally with locks only eleven feet wide, it was operated with great inconvenience until the year 1860. At that time the width of the locks was enlarged to twenty-two feet, corresponding to the locks on the rest of the Lehigh canal, in connection with which it is operated.

*Statement of Operations.\**

Date.	Tons of freight.	Receipts.	Expenses for operation and maintenance.	Net earnings.
1830-40.....		\$948,487	\$48,062	
1850.....	200,905			
1840-50a.....	129,687	55,487		
1855.....		388,914		
1856.....		353,782	83,355	\$270,427
1850-60a.....		274,024	61,152	212,872
1863.....	420,199	156,874	24,826	132,048
1864.....	641,420	236,993	48,617	188,376
1865.....	703,635	247,058	90,289	156,769
1866.....	1,033,712	349,650	81,316	268,334
1867.....	901,584		97,473	
1868.....	901,263	274,915		
1869.....	596,184	198,790	144,000	54,790
1870.....	825,461	221,704	149,509	72,195
1871.....	774,193			
1872.....	835,528			
1873.....	814,220			

\* See also Lehigh Coal and Navigation Co. a = Average.

## ERIE DIVISION - 48, 49, 50.

## FRENCH CREEK CANAL.

## BEAVER CANAL.

## ERIE EXTENSION.

These canals furnished two routes between Lake Erie and the Ohio river with the portion from Lake Conneaut to Lake Erie in common.

They were sold to the Erie Canal Company in 1845 by the State of Pennsylvania, and this company was absorbed by the Pennsylvania Canal Company in 1870. They were operated until the end of the season of 1871, when they were abandoned.

*Statement of Operations.*

## French Creek Canal.

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1830.....			\$2,060	
1840.....		\$645	16,263	d\$15,618
1845.....		97	1,219	d1,122

d = Deficit.

## Beaver Canal.

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1834.....	.....	\$555	.....	.....
1840.....	.....	3,192	\$49,740	d\$46,548
1845.....	.....	1,251	3,972	d2,721
1845-60a.....	.....	64,309	43,199	21,110
1865.....	307,356	134,966	187,460	d52,404
1866.....	355,042	160,487	99,441	61,046
1867.....	327,374	.....	.....	.....
1868.....	220,257	79,247	101,435	d22,188
1869.....	259,474	104,961	103,233	1,728
1870.....	182,017	67,251	78,810	d11,559

a = Average. d = Deficit.

## SCHUYLKILL CANAL. - 51.\*

This canal, one of the oldest, had a more prosperous history than some of the other canals.

It was chartered, in 1815, with the purpose of opening up one of the richest anthracite coal fields of Pennsylvania. The work was begun in 1816 and about 1825 the canal was in operation between Mount Carbon and Philadelphia.

The company did an extremely lucrative business until the beginning of railroad competition in 1842, when the Philadelphia and Reading railroad began competing for the coal trade. The canal could not compete successfully with the railroad and, in order to do so, undertook extensive enlargements. In 1846 and 1847 the depth was increased to six feet, the number of locks was decreased from one hundred and twenty to seventy-one, and the canal made available for boats of one hundred and seventy tons.

This outlay, together with great flood damage in 1850, reduced the company to bankruptcy and although the canal was repaired and operated in 1851, nevertheless, in 1852, it went through a reorganization.

The company of 1852 took up the contest with the railroads, and showed great energy in that direction until 1870, when the Philadelphia and Reading put an end to the conflict by leasing the canal property for nine hundred and ninety-nine years, paying an annual rental of \$655,000.

The canal receipts decreased steadily under the railroad management. In 1898 and thereafter only 89.88 miles were operated between Port Clinton and Philadelphia, and in 1904 the whole canal was abandoned.

The freight rate on this canal varied, for various commodities, from one cent to two and one-half cents a ton per mile, the ton being a gross ton of twenty-two hundred and forty pounds.

\*On the accompanying map this canal should be shown in orange rather than in red.

In 1872, two years after the lease to the Philadelphia and Reading railroad, there were forty-seven lift-locks, eighteen stop-locks, seven guard-locks, and seventeen guard-locks with lift also. Of these locks seventeen were of cut stone, two were of cement, and the remainder were composite, i. e., timber backed with rubble masonry.

The following shows the variation in the traffic on this canal:

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenses.	Net earnings.
1826.....	\$32,404	\$49,481	.....	.....
1827.....	65,501	58,149	.....	.....
1828.....	105,463	87,171	.....	.....
1829.....	134,524	120,039	.....	.....
1840.....	.....	468,380	.....	.....
1860.....	1,651,416	1,089,773	.....	.....
1865.....	1,344,730	1,650,882	\$1,401,431	\$249,451
1869.....	1,100,667	1,159,059	344,428	814,631
1870.....	879,743	.....	.....	.....
1875.....	979,810	737,660	197,792	539,868
1880.....	630,416	537,133	169,952	403,181
1885.....	683,562	307,591	135,070	172,521
1890.....	144,994	81,207	40,089	41,118
1895.....	70,070	39,233	38,865	368
1900.....	82,490	55,693	31,482	24,211
1901.....	83,506	36,792	31,673	5,119
1902.....	68,973	16,125	113,217	d97,092
1903.....	.....	36,338	103,605	d67,267
1904.....	abandoned.	.....	.....	.....

d = Deficit.

THE LEHIGH COAL AND NAVIGATION COMPANY. — 52, 53.

In the year 1793 a company was formed under the title of the "Lehigh Coal Mine Company" which acquired, by purchase and under State warrants, about five-sixths of the anthracite coal land now owned by the Lehigh Coal and Navigation Company.

This company opened the coal mines and appropriated some money to open a road from the mines to the landings, a distance of nine miles. Failing to obtain from the stockholders any adequate sum for this purpose, the mines were allowed to lie idle for a number of years. In the meantime, however, the stockholders endeavored to secure legislative action looking to the improvement of the Lehigh river. Several laws were passed as a result of their efforts, but none of real benefit to them.

A lease of one vein of coal was given by them in 1807 with the privilege of mining iron ore as well. The parties securing this lease failed to make a success of the business and soon after abandoned the lease.

Again, in 1813, the company leased their property for ten years, granting also the right of cutting lumber for boats. The com-

pany holding this lease agreed to market ten thousand bushels of coal a year. The entire consideration demanded by the Lehigh company was the introduction of this quantity of coal into the Philadelphia market. The lessees paid four dollars a ton to a contractor for hauling the coal from the mines to the river, over the above mentioned road. This contract resulted in loss to the contractor.

At the river the coal was enclosed in timber boxes, shaped like crude flat-bottomed boats, and called "arks." These arks, five in number, were despatched down the river, being carried along by the current. Of the five ark loads, so despatched, two reached Philadelphia in safety, the other three being wrecked in the passage.

The price at which the coal was sold to Messrs. White and Hazard, twenty-one dollars a ton, did not cover the expenses and losses incurred by the lessees, and owing to this fact the business was abandoned.

Messrs. White and Hazard were determined to obtain more of this coal, and in 1817 obtained a lease of the property for twenty years. The sole conditions of this lease were the marketing of forty thousand bushels of coal a year, in consideration for which the lessees were to pay the owners *one ear of corn annually*.

Having obtained this lease, Messrs. White and Hazard applied to the Legislature for authority to improve the Lehigh river. In 1818 an act was passed granting this authority. The Legislature, while granting this privilege, reserved the right to compel this firm to extend a slack-water system the entire distance from Easton to Stoddartsville if dissatisfied with the navigation provided.

A survey of the property was commenced in April of this year. The instruments used were borrowed from the Delaware and Schuylkill Canal Company. These were, in fact, the only instruments in Philadelphia at that time.

In attempting to form a stock company, Messrs. White, Hanto and Hazard found it necessary to separate the river improvement from the land improvement. Accordingly two companies were formed. The Lehigh Navigation Company was formed in August, 1818, to undertake the river improvements; the Lehigh Coal Company in October of the same year, to build a road from the mines to the river. This dual organization was due to the fact that some people believed in the river improvement, but were skeptical about the value of the anthracite coal, while others regarded the river improvement as a dangerous experiment, but had faith in the value of the coal fields.

The capital stock of the navigation company was fixed at \$50,000, and the owners of the stock were to receive all earnings up to twenty-five per cent on their holdings annually. All earnings above this were to go to Messrs. White, Hanto and Hazard.

The coal company was capitalized at \$55,000, and the stockholders were to receive all earnings up to twenty per cent of their holdings annually, beyond which all earnings were to go to Messrs. White, Hanto and Hazard.

The grading of the road from the mines to the river, a distance of nine miles, was completed in 1819. This is said to be the first road in this country laid out with instruments and built to well planned grades, and possibly the first road built, without undulations, in any country in which so many natural obstacles to such a road existed.

In 1820 White and Hazard absorbed Hanto's interests in these concerns, and the two companies were combined under the name, "Lehigh Navigation and Coal Company." Additional stock to the amount of \$20,000 was issued at this time for improving the navigation, and three hundred and sixty-five tons of coal were sent to Philadelphia for sale. This quantity completely stocked the market and was disposed of with difficulty.

In 1821 the capital stock was again increased, the name was changed to "The Lehigh Coal and Navigation Company," and the plan of distribution of the earnings was changed so that thereafter Messrs. White and Hazard were merely stockholders in the company. The amount raised by this stock issue was \$50,000, which was expended in further improvements in the river navigation. In this year one thousand and seventy-three tons of anthracite coal were sent to Philadelphia.

In the following year, 1822, an act was passed incorporating the company and the stock was still further increased by \$83,950.

The arks, so called, used in transporting this coal, were rectangular boxes from sixteen to eighteen feet wide, and from twenty to twenty-five feet long, resembling a rough scow. At first two of these were joined together by hinges, and later the number of sections increased to eight or nine. They were steered by a long oar, like a raft. Machinery was introduced for jointing and putting together the planks of which these arks were built, and the men became so expert in building them that five men could build and launch a section in forty-five minutes. These arks were broken up at the end of their journey and the lumber sold. The men employed in guiding them down-stream walked back to the upper end of their route and brought down another consignment.

The corporation was granted a license to receive tolls on this river navigation, but did not collect any tolls until the year 1827.

This method of transporting coal caused the consumption of so much timber that the river was improved in 1823 for sixteen miles above Mauch Chunk, for the purpose of bringing down the timber for building arks. These improvements gave rise to another increase to the capital stock of \$96,050, making the entire capitalization at the end of 1823, \$500,000.

In 1825 the demand for coal had increased to such proportions that 28,393 tons were sent down the Lehigh and 7,143 tons were sent down the Schuylkill, which was now open to navigation. The coal trade had grown to such proportions that a railroad was built in 1827 on the road from the mines to the river. There was at that time only one other railroad in operation in the country, and that was only three miles long. This railroad built by the Lehigh Company sloped from the mines to the river without any up grade in the entire nine miles. The slope was sufficiently steep so that the cars loaded with coal ran from the mines to the river under the influence of gravity. The empties were then drawn back to the mines by mules. On the down trip these mules were loaded in cars, with the coal.

In 1827 the capitalization was increased by the issue of new stock to the amount of \$500,000, and it was determined to establish a complete slack-water navigation on the Lehigh, that would be navigable in either direction. The improvements up to this time had consisted in dams and channel work to facilitate the passage of the arks, and the change in system was a radical one.

At this time, the construction of the Delaware Division canal became a certainty; therefore, the Lehigh company had only to provide for the necessary canals and locks between Easton and Mauch Chunk. The dimensions of the canal were fixed at a width of sixty-feet at water-surface and five feet in depth. The locks were to be one hundred feet long and twenty-two feet wide, adapted to boats of one hundred and twenty tons. The Lehigh slack-water navigation was completed in 1829, and the Delaware Division canal was not navigable until nearly three years later. The failure of the contractors to complete the Delaware Division canal was very costly to the Lehigh company. Arks were the only form of boats that could be used on the Delaware during these three years, and they were very expensive to move on the improved Lehigh slack-water navigation. Moreover, when complete, the locks of the Delaware Division canal were only half as wide as those of the Lehigh, thereby preventing through transportation in the large boats, so that in its early history the Delaware Division canal was a serious handicap to the Lehigh.

In 1835 the extension of the Lehigh canal from Mauch Chunk to Stoddartsville was undertaken in compliance with legislative enactment. In 1837 the Legislature allowed the capital stock to



be increased to \$1,600,000 and repealed so much of their former act as effected the improvement of navigation between White Haven and Stoddartsville. In 1838 the canal extension from Mauch Chunk to White Haven was completed by means of high lifts and the obligations to the State thereby met.

In 1841 the Lehigh canal was visited by a flood that damaged the works so seriously as to render them entirely useless. Owing to this fact, an impression was created that the property was destroyed. As a result of this damage it was necessary, for a time, to put the canal under the management of trustees for the benefit of the creditors. The canal was restored in the following year from Easton to Mauch Chunk and in 1844 to White Haven.

The depth of the canal was increased at this time and other improvements made. The Legislature allowed the increase of the capital stock so as to cover the actual cost of the canal, provided that the total amount should not exceed \$6,000,000.

The canal suffered again from flood damage in 1851, although somewhat less severely than in 1841. Repairs were immediately made increasing the depth of the canal and locks to six feet, in this year.

The financial position of the company was much improved in 1850 by the funding of the claims of the creditors, in whose interests trustees had been appointed in 1842. In 1851 provision was made for converting outstanding bonds into stock, still further strengthening the company.

In 1860 the Delaware Division canal was increased in size so as to admit boats of the same size as the Lehigh, thus conferring great benefit upon the latter.

In 1862 the canal was again visited by a damaging flood and in the year following the canal was repaired, except that part above Mauch Chunk, which was then abandoned.

In 1866 the Lehigh took a lease of the Delaware Division canal for nine hundred and ninety-nine years, and the two have been operated as a single canal ever since. The Lehigh company agreed to pay six per cent annually on the bonds of the Delaware company, amounting to \$800,000, to assume the obligation of paying them, and to pay eight per cent annually on the stock, \$1,633 350. In 1878 the date of payment of these bonds was extended to 1898 and the dividend payment on the Delaware stock decreased from eight per cent to four per cent per annum. In 1898 the date of payment of the bonds was extended to 1948 and the rate on them decreased from six per cent to four per cent.

The Lehigh company owns valuable railroad properties, built as adjuncts of the canal. These railroads, combined with the coal properties, have so increased in value as to form the main asset of the company.

The Lehigh and Susquehanna railroad was built by this company in the years 1837 to 1844. It was designed to connect the Lehigh canal with the North Branch canal of the Pennsylvania system. It extended from Whitehaven to Wilkesbarre, a distance of about twenty miles, and cost originally about \$1,120,000. A description of the present condition of the coal and railroad properties is beyond the scope of the present work.

In the year 1871 the Lehigh Coal and Navigation Company leased its railroad properties to the Central Railroad Company of New Jersey for an annual rental equal to one-third the gross receipts from their operation. In 1873 the same company contracted to operate the Lehigh canal properties, to assume all the obligations involved and to pay an annual rental of \$200,000 to the Lehigh company.

In 1876 the Central Railroad of New Jersey was put in the hands of a receiver. As a result of this, the canal contract was abandoned by the railroad company, and the operation of the canals was resumed in 1877 by the Lehigh company.

The Lehigh Coal and Navigation Company derives to-day large revenues from its coal and railroad properties and its securities are closely held. There is a small annual loss from the operation of the canals, larger than appears in the accompanying table. This table does not show loss due to capital account nor to extraordinary repairs which are frequent.

In 1839 the lower section of the canal, extending from Mauch Chunk to the Delaware river at Easton, was reported as follows:

Pools .....	10	miles.
Canals .....	34.584	miles.
Locks .....	1.632	miles.

Total length ..... 46.216 miles.

Canals sixty to sixty-five feet wide at top water-line, forty-five feet wide at bottom and five feet deep.

Locks.	guard .....	5
	guard with lift .....	3
	lift .....	44
	Total .....	52
	100 feet between quoins, and 85 feet clear. 22 feet wide. 6-9 feet lift. passing boats of more than 100 tons,	

Dams 8	{ 8-19½ feet high.
	{ 300-564 feet long.

Total fall of canal, 352.2 feet.

TABLE SHOWING TONS OF COAL TRANSPORTED ON THE LEHIGH CANAL  
UP TO THE YEAR 1839.

Date.	Tons of coal.	Date.	Tons of coal.
1820.....	365	1830.....	41,750
1821.....	1,073	1831.....	40,966
1822.....	2,240	1832.....	70,000
1823.....	5,823	1833.....	123,000
1824.....	9,541	1834.....	106,244
1825.....	28,393	1835.....	131,250
1826.....	31,280	1836.....	146,522
1827.....	32,074	1837.....	225,937
1828.....	30,232	1838.....	214,211
1829.....	25,110	1839.....	221,850

It was estimated at this time, 1839, that the total cost of conveying freight on this canal per ton per mile, including tolls, was 1.6 cents.

*Statement of Operations.*

Date.	Tons of freight.	Receipts from tolls.	Expenditure for operation and maintenance.	Net earnings, including water rents.
1840.....	281,802	\$143,335	.....	.....
1850.....	884,783	353,131	.....	.....
1860.....	1,338,375	481,119	.....	.....
1865.....	1,047,638	612,803	.....	.....
1870.....	1,123,140	344,308	\$182,343	\$161,965
1875.....	854,643	484,753	186,744	288,009
1880.....	719,338	187,520	78,854	108,666
1881.....	702,714	169,772	113,942	55,830
1882.....	678,894	143,020	87,321	55,699
1883.....	728,988	151,825	86,273	65,552
1884.....	762,588	155,000	77,557	77,443
1885.....	689,554	124,507	79,316	45,191
1886.....	627,653	112,580	84,688	27,892
1887.....	586,060	82,691	72,327	10,364
1888.....	564,489	75,147	65,847	9,300
1889.....	567,669	70,572	62,494	8,078
1890.....	603,662	.....	.....	.....
1891.....	556,141	.....	.....	38,162
1892.....	438,513	.....	.....	31,344
1893.....	397,708	.....	.....	16,987
1894.....	390,514	.....	.....	d16,927
1895.....	409,684	87,263	90,239	d2,976
1896.....	388,313	88,963	.....	d16,060
1897.....	369,878	90,406	.....	11,433
1898.....	344,463	85,089	.....	6,089
1899.....	367,946	87,480	.....	.....
1900.....	380,579	98,068	.....	10,724
1901.....	345,197	.....	.....	d9,077
1902.....	28,589	.....	.....	d77,033

The above statement includes the Delaware Division canal after 1890. d = Deficit.

The report of the entire operation of the Lehigh Coal and Navigation Company for 1902 shows a capitalization of \$35,270,693, and values the Lehigh canal improvements at about \$2,225,300. The total net receipts of the company for that year were reported as being \$2,430,135 from its railroad properties and coal lands. The deficit from the operation of its canals for the same year was \$77,037, owing to flood damage.

## UNION CANAL. — 54.

Including the Pine Grove Branch.

The project of connecting the Schuylkill and the Delaware with the Susquehanna dates back to the eighteenth century. Two companies were formed with this project in view, one in 1791 under the name of Schuylkill and Susquehanna Navigation Company, the other in 1792 under the name Delaware and Schuylkill Canal Company. These two companies were united, but nothing came of their project.

In 1811 a new company was incorporated by the Pennsylvania Legislature under the name, "Union Canal Company of Pennsylvania."

The canal, leaving the Susquehanna at Middletown, joined the Schuylkill at Reading, following the left bank of the Swatara and of the Hocken. It was completed in 1827.

The Pine Grove branch, commenced as a feeder branch or ditch in 1828, was made into a navigable way to the coal field in 1832.

Originally constructed for twenty-five-ton boats, the canal was enlarged in 1850 in its western part and in the Pine Grove branch, and in 1855 in the eastern part as well, so as to allow the passage of eighty-ton boats. The cost of this enlargement, together with the failure of the expected increase in business, resulted in financial embarrassment, and the canal was operated by trustees for bondholders after 1858.

The Pine Grove branch was abandoned in 1862, and the remainder of the canal in 1885.

The tonnage had decreased from 205,517 tons in 1858 to 16,165 tons in 1884.

The capitalization of the company was as follows:

Capital stock .....	\$2,907,850
Bonded indebtedness .....	3,000,000
Floating debt .....	155,000

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenses for operation and maintenance.	Net earnings.
1828.....	18,124	\$15,512	.....	.....
1830-45a.....	95,420	92,081	.....	.....
1847-59a.....	160,567	85,138	.....	.....
1863.....	170,630	76,614	\$74,404	\$2,210
1864.....	199,273	94,679	93,913	766
1865.....	76,061	48,505	47,226	1,279
1866.....	138,228	64,075	65,168	d1,093
1867.....	149,102	75,279	68,754	6,525
1868.....	132,110	60,830	55,522	5,308
1869.....	127,253	43,587	58,698	d15,111
1870.....	110,760	59,952	55,750	4,202
1871.....	127,287	58,590	36,767	21,823
1872.....	124,961	44,862	37,741	7,121
1873.....	119,305	43,349	39,456	3,893
1874.....	77,352	33,692	33,166	526
1875.....	58,495	31,596	29,684	1,912
1876.....	46,500	29,616	20,722	8,894
1877.....	41,962	29,678	21,697	7,981
1878.....	32,526	29,521	21,421	8,100
1879.....	29,663	25,684	16,251	9,433
1880.....	29,853	26,997	22,496	4,501
1881.....	23,316	25,706	23,131	2,575
1882.....	26,251	22,365	21,981	384
1883.....	28,878	19,288	18,676	612
1884.....	16,165	22,964	21,845	1,119
1885... Abandoned in 1885.				

a = Average. d = Deficit.

## SUSQUEHANNA AND TIDE-WATER CANAL - 55.

This canal served as an extension to tide-water of the Pennsylvania canal system. Two distinct companies were organized for this purpose, one in the State of Pennsylvania (the Susquehanna Canal Company), the other in Maryland (Tide-water Canal Company); but the first of these absorbed the second by stock purchase, so that the Susquehanna Canal Company was the real owner of both lines.

The maximum tonnage of 528,000 tons was in 1864, and since that time the railroad competition caused steady decrease in tonnage till the canal was abandoned in 1895.

During the latter years of this canal, it was operated by the Philadelphia and Reading Railroad Company, which leased the canal in 1872 at an annual rental of \$7,000, plus the interest on the canal bonds, plus one-half the net revenue of the canal, with three per cent guaranteed on the capital stock.

The capitalization in 1890 was as follows:

Capital stock .....	\$2,002,746
Bonded indebtedness .....	2,901,311
Floating debt .....	52,412

This canal showed a rapidly decreasing tonnage after 1880, and in 1895 the total tonnage reported was 11,021 tons. It was never operated after that year.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1840.....	.....	\$41,588	.....	.....
1847.....	.....	154,627	\$39,143	\$115,484
1865.....	325,029	380,160	237,297	142,863
1870.....	483,235	134,138	.....	.....
1875.....	430,846	95,840	84,896	10,944
1880.....	382,295	53,630	35,693	17,937
1885.....	341,376	57,500	44,182	13,318
1890.....	32,948	8,686	18,295	d 9,609
1895.....	11,021	2,957	3,626	d 669

d = Deficit.

## CHESAPEAKE AND DELAWARE CANAL. - 60.

This project was conceived in the eighteenth century, and in 1799 a concession was granted to a company by the State of Maryland, and was agreed to by the State of Delaware.

The work was begun in 1804, but was repeatedly interrupted, and in 1822, under a reorganization of the company, the States of Delaware, Maryland and Pennsylvania, in conjunction with the United States Government, subscribed to the stock of the reorganized company.

The line of the canal extends across the peninsula at the narrowest point, from Delaware City to Chesapeake Bay, a little south of the straight line joining Baltimore and Philadelphia.

It is built with swing drawbridges and rapid acting locks and is an efficient ship canal. Through it pass each year great numbers of passengers on the swift Baltimore and Philadelphia boats, besides large quantities of miscellaneous freight.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1831.....	27,375	\$61,223 15	.....	.....
1840-50a.....	221,189	123,541 00	\$35,801 00	\$87,740 00
1850-60a.....	521,707	220,440 00	55,514 00	164,926 00
1876.....	.....	237,616 00	85,727 00	151,889 00
1880.....	959,146	201,783 00	62,245 00	139,538 00
1889.....	736,879	189,117 61	51,786 00	137,331 23
1889-04a.....	760,000	.....	.....	.....
1903.....	704,147	.....	.....	.....
1904.....	706,226	.....	.....	.....

a = Average.

## CHESAPEAKE AND OHIO CANAL. - 61.

As early as 1774, General Washington appears to have conceived the idea of opening up a navigable waterway from the Potomac to the Ohio.

In 1774 he obtained, from the Virginia Legislature, a law au-

thorizing the citizens who wished, to undertake the improvement of the Potomac river as far as Wills creek (Cumberland).

Maryland objected to the proposition on the ground that the improvement of the Potomac would divert business from Baltimore and, as the river was a boundary between the two states, concurrent action was necessary.

The question was taken up again in 1784 by a commission from the two states, of which commission George Washington was a member. The work of this commission served as the basis for the formation of the Potomac River Company. The two States each took a portion of the stock. The stock was rapidly subscribed and in 1785, the whole amount being taken, the enterprise was launched with George Washington as the first president.

The company in 1820 had failed to complete the work, but had accomplished a good deal. The promoters recognized, however, that the enterprise would not be remunerative and soon after it was abandoned.

The locks of the old Potomac company, twelve in number, had lifts ranging as high as eighteen feet. The canal proper connecting the different pools add up 4.78 miles. Of the old locks some are still standing, and are of a high grade of masonry work, well preserved. Their location seems to show that at that time the Potomac low water was much higher than it is now.

In 1822 the idea of substituting a canal in place of improved river navigation was proposed, and in 1823 the Potomac company was authorized to transfer its charter to the Potomac Canal Company, formed under the laws of Maryland and Virginia. The lack of the consent of the United States caused this company to give up the project. Being reorganized in 1825 under the name of Chesapeake and Ohio Canal Company, with authority to extend the canal to Baltimore, it was finally in a position to undertake the work, with the consent of Virginia, Maryland, Pennsylvania and the United States.

The United States treasury subscribed for 10,000 shares of the stock. The work was commenced in 1828 and completed in 1850, when it had cost \$11,071,176.

The canal follows the left bank of the Potomac from Georgetown. It is fed entirely from the Potomac, from which it separates at only one point, Pawpaw Bend, in order to avoid a long curve in the river. The canal and river are connected by numerous locks known as "feeder" locks.

In 1889 the capitalization of the company was as follows:

Capital stock .....	\$3,851,594
Bonds to secure loan from Maryland.....	6,375,000
Other debts .....	3,000,000

This last figure includes the bonds of 1844, amounting to \$1,699,500, issued for the purpose of completing the canal, and those of 1878, issued for the purpose of repairs, amounting to \$87,000.

The competition of the railroads decreased the receipts of the canal steadily, and in 1889, when much of the canal was destroyed by flood, there was neither money nor credit to carry out the necessary repairs.

The canal was consequently abandoned and the sale of the State's interest was ordered. The bondholders of 1844, dissatisfied with the terms of sale, got possession of the canal, and in 1891, by a court decree, took up the outstanding bonds of 1878, spent about \$400,000 in repairs, and put the canal in operation.

Since that time the canal has been operated by the trustees of these bondholders, appointed by the court for successive terms of four years.

It is now in operation transporting between 200,000 and 300,000 tons yearly, mainly coal.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1872.....	922,177	\$476,164	\$222,859	\$253,305
1880.....	655,423	372,616	227,277	145,339
1888.....	286,813	129,470	126,770	2,700
1903.....	252,822	.....	.....	.....
1904.....	254,228	.....	.....	.....

JAMES RIVER AND KANAWHA CANAL. - 64.

The James River Company was incorporated in 1785 by the Legislature of the State of Virginia for the improvement of the James river. It constructed a canal around the falls of the river between Richmond and Westham seven miles long, and improved the river as far as Buchanan.

A second company of the same name, taking the place of the old, in the interest of the State, reconstructed the canal from Richmond to Westham and improved the Kanawha, by dams and navigation passes, from Charleston to the Ohio.

Finally, in 1832, the Legislature of Virginia incorporated the James River and Kanawha Company, of which the organization was perfected in 1835. The State subscribed for three-fifths of the capital stock of the new company, and placed a valuation of \$1,350,000 on the work already done, and on debts due the State from the original company.



The new canal was finished between Richmond and Lynchburg in 1840, with forty-seven locks and a total lift of five hundred and fifty-five feet. The rest of the canal was not completed until 1851 and then only as far as Buchanan. The work above that point was never completed.

The capital stock of that company was \$5,000,000, of which \$1,000,000 represented the work of the old company. The cost of the works amounted to more than \$10,000,000. The company was never able to pay its charges and the operation of the canal was abandoned.

In 1880 the works were sold to the Richmond and Allegheny Railroad. This company failed and the line of the canal was sold to the Chesapeake and Ohio railroad, which made use of the old tow-path for a road-bed; so that now a portion of the old canal is used as the road-bed of a railroad, and the remainder is abandoned.

#### ALBEMARLE AND CHESAPEAKE CANAL. - 65.

The two parts of this canal open a continuous waterway from the Chesapeake to Albemarle Sound. This waterway, together with the Delaware and Raritan and the Chesapeake and Delaware, was designed to furnish a continuous, coastwise, inland water route.

The first part of the canal extends from the southern branch of Elizabeth river into Currituck Sound and the second extends from Currituck Sound to North river, a branch of Albemarle Sound.

The approaches to this canal are being dredged to a depth of nine feet and eighty feet wide, by the National Government, under authority of an act adopted in 1890. The United States Government had spent a large sum on these approaches before that project was adopted. The whole amount expended by the Government amounted to about \$300,000 up to 1903. During the calendar year 1902, the number of vessels passing through the canal was three thousand three hundred and twenty-five, with from three to nine feet draught and an average tonnage of one hundred and nine tons.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1866.....	.....	\$50,588	.....	.....
1867.....	.....	59,493	.....	.....
1868.....	.....	58,270	.....	.....
1869.....	.....	56,525	.....	.....
1870.....	.....	58,230	.....	.....
1871.....	.....	64,285	.....	.....
1872.....	.....	71,098	.....	.....
1873.....	.....	84,839	\$8,924	\$75,915
1880.....	400,000	.....	.....	.....
1889.....	316,793	86,138	56,432	29,706
1902.....	199,062	.....	.....	.....

**DISMAL SWAMP CANAL. - 66.**

This canal, begun under a joint charter of Virginia and North Carolina, was opened in 1794. Patrick Henry was a liberal subscriber to the stock in 1791. The canal was enlarged and was opened for navigation on the thirty-first of December, 1828.

The canal connects the waters of the Elizabeth river with the Pasquotank river in North Carolina, an arm of Albemarle Sound.

The canal proved to be of great value in the war of 1812 as a means of transporting war supplies, free from the danger of capture by the enemy's cruisers.

In 1899 the depth of the waterway was only two and five-tenths feet, although originally it had been six feet. In that year the United States Government undertook to dredge the approaches to a depth of ten feet, and a width of one hundred feet in Deep creek, and Turners cut in Croatan Sound, to a depth of twelve feet, and a width of two hundred feet. The cost of this work to 1903 was \$251,196.

The private company, owning the canal at the same time, deepened the channel so that vessels of ten feet draught could pass through; but owing to shallow places in the canal, vessels of more than nine feet draught do not pass through.

The total number of vessels passing through the canal in 1902 was thirty-nine hundred and five with an average tonnage of two hundred and forty-eight for the barges.

The freight passing through in 1901 was 214,263 tons valued at \$1,485,409. In 1902 the freight passing through had increased largely, being valued at \$2,485,161.

**NEW BERNE AND BEAUFORT CANAL. - 68.**

The Clubfoot and Harlowe Creek canal, so called by the United States Engineers.

A large part of the water route from New Berne to Beaufort consists of navigable waterways improved by the United States.

The distances are as follows: New Berne to Clubfoot creek, twenty-one miles; thence to Clubfoot and Harlowe canal, five miles; thence through the canal three and two-tenths miles to Harlowe creek; thence to Newport river, two and eight-tenths miles; thence to Beaufort, seven miles,

The project, adopted in 1883 and begun in 1884, provided for a thirty-foot waterway, five feet deep throughout; but work has been suspended pending the sale of the Clubfoot and Harlowe canal to the Government.

The depth of the canal, in fact, is only two feet, due to shoaling, and practically the whole commerce consists of rafts and logs.

In 1900 the total tonnage conveyed over the canal amounted to 35,779 tons against 66,974 tons in 1902, showing a general increase.

WATEREE CANAL. - 72.

CATAWBA CANAL. - 73.

LANDSFORD CANAL. - 74.

The Wateree or Catawba river unites with the Congaree river to form the Santee. The canals along the Catawba were built by the State about 1826 in order to extend navigation above Camden, where it stopped then and also to-day.

These canals were never fully completed and were never made use of. The names, even, given to the different small canals, connecting the different ports, never became fixed. Various descriptions of these canals both name and divide them differently.

LORICK'S CANAL. - 77.

DREHER'S CANAL. - 78.

BANKNIGHT'S CANAL. - 79.

These canals form a series of canals along the banks of the Saluda river, utilizing the river bed where possible.

The names, divisions and dimensions of these canals are variously given and they appear never to have been of any great importance.

The divisions and dimensions given in the accompanying table are those of H. Vétillart.

AUGUSTA CANAL. - 80.

The canal, projected about 1845 by citizens of Augusta for a water-supply and for water-power, was completed in 1847 and enlarged in 1875.

Although belonging to the city, it was operated by a private corporation for a time and is now operated by the city itself, which does not collect any toll for its use as a waterway.

*Statement of Operations.*

Date.	Tons of freight.
1880.....	2,697
1889.....	23,665
1903.....	2,514

No tolls are charged.

## OKEECHOBEE CANAL. - 84.

The Atlantic and Gulf Coast canal and Okeechobee Land Company, incorporated under the laws of Florida to drain the region of the Okeechobee, was authorized to make use of the natural watercourses and to construct the necessary canals.

The company built, under this authorization, between Lake Okeechobee and the upper part of the Caloosahatchie river, a canal twenty-two feet wide and five feet deep, minimum dimensions.

This canal, built with no intention of navigation, established, as a matter of fact, a navigable waterway three hundred miles long from the Gulf of Mexico into the middle of Florida by way of San Carlos Bay, Caloosahatchie river, the Kissimmee river, Lake Okeechobee, Lakes Kissimmee, Cypress and Tohopekaliga. Steamboats sometimes pass up it, but there is no regular service.

## CARONDELET CANAL. - 85. (Old canal.)

The Carondelet canal was constructed in 1794 by the Governor of Carondelet with slave labor, furnished by the residents.

The canal forms, with bayou Saint John, a continuous waterway between New Orleans and Lake Ponchartrain.

This franchise was granted by the Territory of Louisiana, in 1805, to the Orleans Navigation Company. In 1852 it was granted by the State of Louisiana to the New Orleans Canal and Navigation Company, which was, in turn, replaced in 1857 by the Carondelet Canal and Navigation Company. The franchise of this latter company was, in 1858, limited in duration to fifty years.

This canal and others of Louisiana are somewhat uncertain as to nomenclature and the names here given are those of H. Vétillart.

In 1880 the total tonnage carried on the canal was 140,988 tons; in 1889 it was 66,476 tons and in 1904, 34,850 tons.

## OHIO CANALS. - 92, 93, 94.

The first step toward the construction of the canals in Ohio was taken by the Governor of the State in 1819, when he recom-

mended surveys for a navigable waterway between Lake Erie and the Ohio. In the following year the Legislature authorized the surveys.

The construction of the canals was ordered in 1825 and the work was immediately put under way.

Different parts of the Ohio, and of the Miami and Erie, were in operation in 1827 and in 1829. The main lines were completed in 1835, and the Walhonding and the Hocking in 1845.

The United States Government gave the State, in 1827-9, a total of 1,230,522 acres of land to be used in aid of this work. The sale of these lands brought in \$2,257,487.

The total cost of construction of the entire system was nearly \$16,000,000. The cost of maintenance and repairs from 1827 to 1903 was \$12,063,849.

These canals, operated originally by the State, were leased to a company in 1861 for ten years, and again in 1871, for another period of ten years. In 1877, however, owing to the destruction of the Hamilton reservoir, the lease of the canal was surrendered. A receiver, appointed at this time, operated the canals from December 1, 1877, to May 15, 1878, at a cost of \$45,299, while the earnings reached \$69,766.

The board of public works took charge at that time, and have since been in charge of the operation of the canals.

The lessees paid the State, during the sixteen years that they had control of these canals, \$331,237.50. This amount is less by far than the receipts under State management at any time in the canals' history. The total receipts on all the canals of the State in the years 1827 to 1903, inclusive, amounted to \$16,562,103, showing a surplus over expenses of \$4,498,254 for the entire period. The value of the property is estimated at fully the original cost, so that neglecting the item of interest on the original outlay, this surplus, though small, is a real net profit.

The Ohio and Erie canal was commenced in 1825 and was completed in 1833 at a cost of \$7,904,972.

It leaves the Ohio river at Portsmouth whence it runs nearly north along the west side of the Scioto river to Circleville. At that point it crosses the Scioto river to the east side and continues along it to the southern part of Franklin county, where the Columbus feeder empties into the canal. There the canal swings to the east and crosses over the Licking summit to the Tuscarawas river which it strikes at Coshocton, the junction of the Tuscarawas and the Walhonding rivers.

From Coshocton the canal follows up the valley of the Tuscarawas river to its head waters, and then crosses over the summit at Akron, to the valley of the Cuyahoga river, along which the canal extends to Cleveland on Lake Erie.

The Licking summit level, fourteen miles long, now practically although not officially abandoned, was fed by the south-fork Licking feeder. It is four hundred and thirteen feet above the Ohio river and begins one hundred and sixteen miles from Portsmouth, in which distance there are fifty-three locks. From the Licking summit the canal descends one hundred and sixty feet by nineteen locks to Dresden Junction, where there is a side-cut leading into the Muskingum river. Thence the canal ascends by twenty-nine locks, two hundred and thirty-eight feet to the Portage summit. This level, nine miles long, is three hundred and ninety-five feet above Lake Erie, seventy-eight feet above the Licking summit, four hundred and ninety-one feet above the Ohio river at Portsmouth and nine hundred and sixty-eight feet above the level of the sea. This level ends near Akron and the descent of three hundred and ninety-five feet to Lake Erie is accomplished by forty-two locks in the distance of thirty-five miles.

#### MIAMI AND ERIE CANAL. - 95.

The Miami and Erie canal was commenced in 1825 and completed in 1845, at a total cost of \$8,062,681.

The main canal extends from the Ohio river at Cincinnati to Lake Erie at Toledo, a distance of two hundred and forty-four miles. There is also a feeder fourteen miles long, and a second feeder eleven miles long, both navigable, bringing the total mileage of this canal up to two hundred and sixty-nine miles.

There is one summit on this canal, called the Loramie, one hundred miles north of Cincinnati. Originally there were fifty-three locks south of the summit, with a total lift of five hundred and twelve feet. In 1863, however, the outlet of the canal was granted to the city of Cincinnati, ostensibly for sewer and street purposes, thereby cutting off ten locks. This grant has been a great handicap to the canal and the property, so granted, is now occupied by the P. C. C. & St. L. Ry. Co.

The north end of the summit is one hundred and twenty-three miles south of Toledo and the descent is three hundred and ninety-five feet, accomplished by fifty-two locks.

In 1864 several miles of the Miami and Erie were given to the City of Toledo, but excellent terminal facilities were provided to replace this loss. Electric haulage has been installed on sixty-eight miles of this canal, but has not proved successful. A standard gauge single track is built along the tow-path, on which runs an electric locomotive capable of hauling from five to seven boats in a tow.

In 1872 several miles of the Ohio and Erie canal in the City of Cleveland were granted to the city to the great detriment of the canal.

In 1876 the lower part of the Hocking canal was abandoned and in 1888 the Wabash and Erie canal entire was abandoned.

The remaining portion of the Hocking canal was abandoned in 1894, and all but six miles of the Walhonding in 1896.

At present there are under way extensive repairs of the Ohio canal system and the restoration of its connection with the Muskingum River improvement, now under the control of the United States Government. These repairs will give only four and one-half feet of water, but the Ohio Canal Association is working ultimately for an enlarged prism, and the rebuilding of abandoned works, so as to provide a seven-foot system of navigation from the Great Lakes to the gulf.

TABLE SHOWING THE EXPENDITURES EACH YEAR FOR SUPERINTENDENCE, REPAIRS AND COST OF COLLECTION ON THE OHIO CANALS, FROM 1827 TO 1903, INCLUSIVE.

Year.	Ohio canal.	Miami and Erie canal.	Hocking canal.	Walhonding canal.	Total on all the canals.
1827.....	\$700 00	.....	.....	.....	\$700 00
1828.....	900 00	.....	.....	.....	900 00
1829.....	1,100 00	\$11,529 59	.....	.....	12,629 59
1830.....	1,300 00	7,138 05	.....	.....	8,438 05
1831.....	2,100 00	7,155 06	.....	.....	9,255 06
1832.....	3,600 00	9,937 91	.....	.....	13,537 91
1833.....	33,740 00	7,643 83	.....	.....	41,383 83
1834.....	79,713 68	10,165 37	.....	.....	89,879 05
1835.....	81,711 15	19,152 57	.....	.....	100,863 72
1836.....	91,402 26	30,993 77	.....	.....	122,396 03
1837.....	123,463 22	49,231 91	.....	.....	172,695 13
1838.....	202,248 30	35,357 25	.....	.....	237,605 55
1839.....	204,709 65	47,491 19	.....	.....	252,200 84
1840.....	122,249 65	25,053 55	.....	.....	147,303 20
1841.....	133,454 53	53,462 55	.....	.....	186,917 08
1842.....	139,165 87	23,506 70	.....	.....	163,726 57
1843.....	126,046 24	36,826 05	.....	.....	162,872 29
1844.....	122,052 21	37,081 55	.....	\$1,238 10	160,371 86
1845.....	126,274 23	53,511 52	\$5,580 04	3,137 61	188,503 40
1846.....	78,433 09	115,668 03	5,105 56	1,483 56	200,690 24
1847.....	120,728 24	107,380 25	8,067 32	5,155 59	241,331 40
1848.....	137,803 28	132,050 59	17,826 17	1,875 53	289,555 27
1849.....	120,283 14	259,706 84	10,712 85	2,523 57	393,206 40
1850.....	124,754 57	151,346 57	12,201 14	2,066 63	390,388 91
1851.....	137,262 50	179,311 73	8,376 88	4,351 60	329,302 61
1852.....	112,367 52	270,471 18	14,540 85	3,064 32	400,443 87
1853.....	142,281 71	269,435 44	9,088 61	2,151 53	422,957 29
1854.....	117,847 89	216,371 97	10,867 31	1,796 85	346,884 02
1855.....	100,145 05	233,107 57	7,741 98	1,169 61	348,164 21
1856.....	120,299 54	236,193 62	41,872 86	12 14	398,378 16
1857.....	125,545 15	172,047 70	29,399 32	5 84	327,098 01
1858.....	155,497 30	157,401 30	26,745 93	661 35	340,295 88
1859.....	96,407 58	159,813 90	15,389 99	2,529 65	274,141 12
1860.....	180,858 97	148,514 64	12,124 17	4,313 19	345,810 97
1861.....	36,534 70	69,697 27	6,336 80	2,004 56	114,573 33
1862.....	5,036 69	1,025 74	375 00	.....	6,437 43
1863.....	2,915 37	1,050 00	694 14	.....	4,659 51
1864.....	2,419 02	11 90	.....	.....	2,430 92
1865.....	2,394 24	5,472 66	.....	.....	7,856 90
1866.....	3,733 34	2,144 14	378 79	.....	6,256 27
1867.....	6,699 66	2,317 29	.....	.....	9,016 95
1868.....	9,533 33	998 18	.....	.....	10,531 51
1869.....	5,300 00	3,879 20	.....	.....	9,179 20
1870.....	3,067 38	13,601 79	968 00	.....	17,637 17
1871.....	1,943 96	11,583 75	78 18	.....	13,605 86
1872.....	4,844 04	7,015 68	.....	.....	11,859 72
1873.....	22,948 78	6,914 10	.....	.....	29,862 88
1874.....	1,919 03	11,319 35	.....	.....	13,238 38
1875.....	1,961 04	1,001 15	.....	.....	2,962 13

TABLE SHOWING THE EXPENDITURES EACH YEAR, ETC.—

(Continued).

Year.	Ohio canal.	Miami and Erie canal.	Hocking canal.	Walhonding canal.	Total on all the canals.
1876.....	\$2,097 16	\$14,325 87	\$900 00	.....	\$17,323 03
1877.....	1,961 04	2,019 78	2,719 25	\$459 84	7,159 91
1878.....	40,282 39	49,717 78	8,597 88	676 09	99,274 14
1879.....	68,249 14	82,547 69	9,833 13	473 85	161,123 81
1880.....	85,434 94	108,972 95	10,830 05	.....	205,237 94
1881.....	88,178 10	86,279 87	11,430 24	.....	185,888 21
1882.....	82,102 22	101,769 14	8,674 36	400 00	192,945 72
1883.....	92,666 88	47,363 79	34,770 43	.....	174,804 80
1884.....	122,644 86	89,596 78	17,684 63	489 56	230,415 83
1885.....	103,180 87	98,449 55	7,458 13	1,511 74	210,600 29
1886.....	87,046 74	88,935 64	10,237 76	10,630 72	196,850 86
1887.....	103,281 89	71,431 06	5,529 32	4,578 62	184,820 89
1888.....	123,690 87	98,838 94	7,379 67	2,095 18	232,004 66
1889.....	88,519 30	8,353 19	6,219 11	890 15	163,981 75
1890.....	80,512 64	79,137 41	4,318 79	945 12	164,913 96
1891.....	89,773 15	78,685 68	1,938 10	1,028 35	171,425 28
1892.....	85,027 86	97,434 09	5,731 51	860 66	189,054 12
1893.....	83,333 61	63,092 29	3,215 54	1,059 99	150,701 43
1894.....	105,490 39	118,827 21	4,396 65	2,843 27	231,557 52
1895.....	67,072 80	80,583 84	.....	.....	147,656 64
1896.....	77,912 51	100,218 95	.....	.....	178,131 46
1897.....	64,685 36	83,642 02	.....	.....	148,327 38
1898.....	85,532 60	94,417 65	.....	.....	179,950 25
1899.....	80,139 76	81,791 94	.....	.....	171,931 70
1900.....	95,974 07	74,773 49	.....	.....	170,747 56
1901.....	78,526 43	137,715 47	.....	.....	216,241 90
1902.....	70,315 96	105,625 45	.....	.....	175,941 41
1903.....	70,364 15	153,750 95	.....	.....	224,115 10
Totals.....	\$5,817,814 50	\$5,770,304 42	\$407,256 14	\$68,474 07	\$12,063,849 13

TABLE SHOWING THE RECEIPTS ON ALL THE CANALS, FROM 1827 TO 1903, INCLUSIVE.

Year.	Ohio canal.	Miami and Erie canal.	Hocking canal.	Walhonding canal.	Total on all the canals.
1827.....	\$1,500 00	.....	.....	.....	\$1,500 00
1828.....	4,000 00	\$8,042 70	.....	.....	12,042 70
1829.....	27,000 00	20,941 36	.....	.....	47,941 36
1830.....	30,493 93	30,082 32	.....	.....	60,576 25
1831.....	64,864 17	36,643 88	.....	.....	101,508 05
1832.....	79,982 48	36,847 47	.....	.....	416,829 95
1833.....	136,555 70	50,470 63	.....	.....	187,026 33
1834.....	164,488 98	50,040 99	.....	.....	214,529 97
1835.....	185,664 48	51,917 00	.....	.....	237,581 48
1836.....	211,823 32	50,116 52	.....	.....	261,939 84
1837.....	293,428 79	62,833 40	.....	.....	356,262 19
1838.....	382,135 96	82,863 09	.....	.....	464,999 05
1839.....	423,599 84	82,601 19	.....	.....	506,201 03
1840.....	462,122 03	74,612 88	\$5,953 69	.....	532,688 60
1841.....	416,202 63	76,718 17	2,518 26	.....	495,439 06
1842.....	387,442 22	71,460 34	4,215 07	\$610 17	463,727 80
1843.....	322,754 82	105,640 09	4,349 33	837 77	433,682 01
1844.....	343,710 99	139,844 25	5,286 44	1,976 78	490,818 46
1845.....	260,369 33	185,243 78	5,497 83	1,282 95	452,393 89
1846.....	336,339 69	233,527 24	5,351 52	1,190 71	576,409 16
1847.....	452,530 76	292,037 00	7,299 14	2,328 77	754,195 67
1848.....	418,533 37	325,297 32	8,746 98	1,933 01	754,507 68
1849.....	362,630 48	322,244 43	8,354 84	1,594 72	694,824 47
1850.....	388,905 93	311,589 27	8,077 44	2,549 04	711,021 68
1851.....	432,711 38	351,897 72	11,802 04	2,613 44	799,024 58
1852.....	208,937 40	308,984 56	9,957 25	1,880 80	629,758 01
1853.....	258,793 09	323,599 97	11,912 21	1,233 25	595,538 53



TABLE SHOWING THE RECEIPTS ON ALL THE CANALS, ETC.—  
(Continued).

Year.	Ohio canal.	Miami and Erie canal.	Hocking canal.	Walhonding canal.	Total on all the canals.
1854.....	\$192,837 18	\$280,115 80	\$12,597 18	\$223 66	\$485,773 82
1855.....	196,164 61	229,370 57	16,279 35	377 20	442,191 73
1856.....	189,506 55	119,947 02	11,118 29	501 89	321,073 75
1857.....	155,598 11	153,733 37	18,219 41	268 54	327,819 43
1858.....	108,771 84	153,928 09	16,367 54	798 46	279,865 93
1859.....	88,205 85	127,610 10	18,336 36	527 18	234,679 49
1860.....	90,968 39	159,476 64	16,494 28	789 70	267,729 01
1861.....	36,534 70	64,632 31	7,363 48	755 04	109,285 53
1862.....	5,036 69	4,664 00	285 67	.....	9,986 36
1863.....	.....	6,186 11	.....	.....	6,186 11
1864.....	.....	3,531 66	.....	.....	3,531 66
1865.....	2,790 50	800 00	.....	.....	3,590 50
1866.....	2,199 50	.....	.....	.....	2,199 50
1867.....	5,300 00	.....	.....	.....	5,300 00
1868.....	1,200 00	.....	.....	.....	1,200 00
1869.....	.....	2,400 00	.....	.....	2,400 00
1870.....	.....	.....	.....	.....	.....
1871.....	.....	311 00	.....	.....	311 00
1872.....	.....	.....	.....	.....	.....
1873.....	.....	.....	.....	.....	.....
1874.....	.....	.....	.....	.....	.....
1875.....	.....	.....	.....	.....	.....
1876.....	.....	.....	.....	.....	.....
1877.....	.....	.....	.....	.....	*401,003 09
1878.....	54,026 99	54,138 89	5,513 98	5,516 98	119,196 84
1879.....	76,609 21	112,090 32	8,185 69	275 32	197,160 54
1880.....	77,545 66	111,259 67	19,235 58	7,470 45	215,511 36
1881.....	61,819 03	109,122 88	6,304 45	608 41	177,854 77
1882.....	57,703 25	98,764 97	5,614 43	1,573 89	163,656 54
1883.....	44,873 52	88,904 17	3,693 47	920 42	138,391 58
1884.....	37,787 79	83,992 14	2,271 41	448 30	124,499 64
1885.....	25,149 98	76,156 21	2,587 18	71 95	106,965 32
1886.....	27,071 78	76,043 57	3,199 29	945 71	107,260 35
1887.....	28,932 35	87,200 36	4,138 38	932 34	121,203 43
1888.....	29,509 46	75,955 13	3,798 36	906 02	110,168 97
1889.....	28,005 47	79,476 82	2,605 15	892 12	110,979 56
1890.....	29,489 20	73,788 02	1,629 17	933 18	105,839 57
1891.....	42,756 24	63,876 47	856 38	1,023 48	108,512 57
1892.....	24,990 37	86,722 96	1,197 37	923 64	113,834 34
1893.....	29,023 90	66,211 86	689 33	588 00	96,513 09
1894.....	22,716 35	74,716 75	120 51	6,671 73	104,225 34
1895.....	24,544 25	80,324 41	.....	a	104,868 66
1896.....	25,591 24	97,327 12	.....	.....	122,918 36
1897.....	26,132 17	80,293 14	.....	a	106,425 34
1898.....	22,380 54	57,433 64	.....	a	79,814 18
1899.....	21,657 71	69,151 41	.....	.....	90,809 12
1900.....	24,883 25	61,896 70	.....	a	86,779 95
1901.....	20,223 42	67,180 60	.....	a	87,404 02
1902.....	24,314 96	63,148 23	.....	.....	87,463 19
1903.....	35,776 56	71,229 40	.....	.....	107,005 96
Totals.....	\$9,146,447 36	\$7,072,214 09	\$288,469 42	\$54,972 14	\$16,562,103 01

a Receipts from Walhonding canal included in Ohio canal receipts.

\* From lessees and receiver from 1861 to 1878, inclusive.

TABLE SHOWING THE GROSS RECEIPTS, TOTAL EXPENDITURES AND  
NET EARNINGS FROM 1827 TO 1903, INCLUSIVE.

Year.	Gross receipts.	Total expenditures.	Net earnings.
1827 to 1903 (inclusive).....	\$16,562,102 71	\$12,063,849 13	\$4,498,253 58

## OHIO AND PENNSYLVANIA CANAL. - 98.

This canal was designed to connect the Ohio canal with the Pennsylvania network of canals and was surveyed in 1827. It was constructed in 1838 by a company, a third part of whose stock was subscribed by the State.

In 1852 the Mahoning railroad was built by a company whose stockholders were the owners of a large part of the canal shares. These stockholders obtained from the State of Ohio all stock in the canal held by the State, paying \$30,000 and agreeing to keep the canal navigable.

The railroad company, having obtained control of the canal, raised the tolls so high as to be practically prohibitive. As a result of this policy the entire traffic on the canal was thrown into the hands of the railroad. The neglect of the works had caused serious delay and, after lengthy legal procedure, the canal was formally abandoned.

## WABASH AND ERIE CANAL. - 100.

This canal ran diagonally across the State of Indiana, uniting with a branch of the Miami and Erie at the Ohio line and obtaining through this an outlet to Lake Erie at Toledo.

There was never any profitable operation of this canal and it was abandoned at an early date, being utterly unable to compete with the railroad for the transportation of freight.

In order to assist the State of Indiana in the construction of this canal, Congress donated, in 1845, to the State one-half the public lands on both sides of the canal, within a distance of five miles from the canal, and also one-half the public lands in the district of Vincennes.

TABLE SHOWING THE LENGTH IN MILES AND THE AMOUNT OF TOLLS  
RECEIVED AT VARIOUS DATES.

Year.	Length in miles.	Tolls.
1846. ....	138	\$102,424
1847. ....	175	125,883
1848. ....	189	146,149
1849. ....	189	134,659
1850. ....	226	157,158
1851. ....	281	179,283
1852. ....	281	193,400
1853. ....	308	181,206
1854. ....	308	180,535
1855. ....	380	140,399
1856. ....	380	113,423

## ILLINOIS AND MICHIGAN CANAL. - 102.

Including the locks at Henry and the Copperas creek on the Illinois river.

This canal was undertaken by the State of Michigan to connect the Mississippi river with Lake Michigan at Chicago.

In 1808 Albert Gallatin recommended, in a report to the Federal Congress, the construction of such a canal and, as a result, there was a survey made in 1816.

In 1822 Congress granted the right of way for the canal, commissioners were appointed, and \$6,000 was appropriated for investigations and a survey.

In 1827 Congress donated to the State, for canal purposes, 300,000 acres of land, and in 1829 the State appointed commissioners to sell these lands and apply the proceeds to the construction of the canal. In 1833 the canal commission was abolished and the affairs of the canal put in the hands of regular State officers.

Work on this canal was begun in 1836 by the State and was carried till the year 1841, when the funds were exhausted. In 1845 the work was resumed and so far completed, in 1848, that the canal was opened for traffic. The cost up to this time had been \$6,170,226.

The canal leaves the Chicago river, about five miles from its mouth, and extends in a southwesterly direction across the summit to the valley of the Des Plaines, some eight miles away. It follows down the valley of the Des Plaines to its junction with the Kankakee. The junction of these two rivers forms the Illinois river and the canal extends from this point down the valley of this latter river to its terminus at La Salle. Below this point the river is considered navigable.

The canal has five navigable feeders, the Calumet, Des Plaines, Du Page, Kankakee and Fox rivers, and receives also the waters of the Great Lakes in its summit level by way of the Chicago river.

As first built, the water of the Chicago river was pumped into the summit level, but later the summit level was deepened so that the flow of the Chicago river was partially reversed and flowed into the canal instead of into Lake Michigan.

The building of the Chicago Drainage canal so lowered the Chicago river that the necessary depth of six feet in the summit level of the Illinois and Michigan canal was no longer maintained. The State brought action against the sanitary district of Chicago to compel them to preserve this navigable depth by pumping, but the litigation was finally settled in 1901 adversely to the State.

At present, work is in progress on a system of locks connecting the two canals at Joliet. After the completion of these locks

the expectation is that the Chicago Drainage channel will replace the canal from this point to the lake.

The canalization of the Illinois river from La Salle to the mouth of the river, two hundred and twenty-three miles below, is partly under State control and partly under the control of the Federal Government. The State owns and operates the two locks at Henry and at Copperas creek, and the United States, the two below. One of these is at Lagrange and the other at Kampsville. The river navigation below La Salle is not yet altogether satisfactory.

The sale of the Illinois and Michigan canal to the United States Government, to be operated in connection with the Illinois and Mississippi canal, has been proposed, but so far has been made impossible by the unreasonable demands of the State.

*Statement of Operations.*

Date.	Tons of freight.	Receipts from tolls.	Gross expenses.
1877.....	605,912	\$96,913	\$82,330
1878.....	598,792	84,330	97,701
1879.....	669,559	89,064	125,601
1880.....	751,360	92,296	102,223
1881.....	826,133	85,130	104,412
1882.....	1,011,287	85,947	116,756
1883.....	925,575	77,975	99,289
1884.....	956,721	77,102	86,393
1885.....	827,355	66,800	72,430
1886.....	808,019	62,516	71,385
1887.....	742,074	58,024	76,845
1888.....	751,055	56,028	85,478
1889.....	917,047	60,605	75,125
1890.....	742,392	55,112	72,592
1891.....	641,156	49,551	67,137
1892.....	783,288	54,937	59,522
1893.....	529,816	38,702	54,258
1894.....	617,811	44,928	71,142
1895.....	591,509	39,106	77,987
1896.....	446,762	32,100	68,307
1897.....	484,575	33,065	78,986
1898.....	395,017	38,570	91,196
1899.....	469,352	41,021	88,317

THE CHICAGO DRAINAGE CANAL. - 103.

The construction of this canal was brought about by the dissatisfaction of the residents of Chicago with their water-supply and sewage disposal.

Previous to the construction of the canal the sewage of the city was discharged into Lake Michigan, largely through the Chicago river, and the city water-supply was drawn from Lake Michigan also.

The summit between the head waters of the Chicago river emptying into Lake Michigan and the Illinois river flowing into the Mississippi and thereby into the Gulf of Mexico, was suffi-

ciently low as to suggest a canal connecting the head waters of the Chicago river with the Illinois. This connection has been accomplished by the Chicago Drainage canal.

This canal is wholly below the lake level and slopes toward the Illinois river. A part of the Chicago river has been deepened at the same time, so that the slope of its river bed has been reversed, and now, together with the canal, a part of the Chicago river forms a waterway in which the current is the reverse of that formerly found in the Chicago river.

Whereas formerly this river carried to the lake the run-off of a certain drainage area, together with the city sewage, to-day the waters of the lake run off through the old river bed into the Des Plaines and Illinois rivers and eventually into the Gulf of Mexico.

The Chicago sewage is carried by this stream into the waters of the Mississippi river, leaving the lake waters uncontaminated for use as a water-supply. An additional advantage is obtained from the comparatively rapid flow of the water in the canal, which quickly removes the sewage from the vicinity of the city.

The work has involved the dredging from Lake Michigan to Ruby street, the construction of a covered conduit from Monroe to Van Buren street, rebuilding several bridges across the Chicago river, redocking, widening and deepening the channel.

The distance from the mouth of the Chicago river to the junction with the main channel is 5.8 miles. The main channel extends from this point to Lockport, a distance of 28.05 miles. Here are situated the controlling works and beyond them the water is discharged down the declivity into the Des Plaines river, through the City of Joliet, a distance of 7.1 miles.

The work was begun in 1892 and completed in January, 1900. The standard dimensions were one hundred and sixty feet at bottom in rock cut and one hundred and sixty-two feet at the top, the channel being designed to carry twenty-two feet of water. In earth sections the standard width at water-surface is two hundred and ninety feet and at bottom two hundred and two feet. The slope in the rock section is 1:20,000 and in the earth section, 1:40,000. The upper Des Plaines river was diverted from its bed and its old bed utilized for the canal.

In the controlling works at Lockport are seven large metal sluice-gates having a vertical play of twenty feet and thirty-foot openings. There is also a bear-trap dam with an opening one hundred and sixty feet long and a vertical oscillation of seventeen feet.

The total cost of the work to the time of its completion was \$33,525,691. The total expenditure on this work to date has been \$46,610,992.

There has been a large general interest in this canal, due in part to the possibility of utilizing it as the beginning of a ship canal from the lakes to the gulf by way of the Mississippi river.

Its use so far has been sanitary rather than as a waterway, and still further improvements are needed in order to make the work entirely successful as a solution of the city's problem of sewage disposal.

#### WILLAMETTE FALLS CANAL. - 104.

The canal and locks were built during the years 1870-72 by the Willamette Falls Canal and Locks Company and were opened for traffic in 1873. They were sold March 8, 1876, to the Willamette Transportation and Locks Company and again sold in 1892 to the Portland General Electric Company.

By the terms of the State legislative act, dated October 21, 1870, the State could have taken possession in 1893 on payment of their actual value, but unfortunately the option was allowed to lapse.

March 3, 1899, a board of United States engineers were ordered to examine the locks and report on the desirability of their acquisition by the United States Government. It is from their report that this description is taken.

This board reported in favor of the acquisition, provided the works could be obtained for a reasonable sum. They reported, also, that they regarded \$1,200,000, the price demanded by the present owners, as excessive.

The locks and canal consist of a flight of four locks having a lift of about ten feet each, a canal basin just above these about twelve hundred and fifty feet long, and a guard-lock two hundred and ten feet long connecting this basin with the upper level. An upper entrance about one thousand feet long makes the total length of the canal, including the locks and entrance, about thirty-five hundred feet.

The lower part of the canal, including four locks, is roughly cut in the solid rock and wooden fenders are placed at intervals, to protect the sides of the vessels passing through the canal.

There is a low dam along the crest of the natural fall in order to secure an even crest and to raise the water-surface probably not over eighteen inches or two feet.

The works are in bad repair and little is being done to improve them. The water in the canal is used for manufacturing purposes to such an extent as to seriously interfere with the usefulness of the canal to navigation. As a waterway this canal leaves much to be desired.

The following table shows the results of its operation :

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1882.....	13,614	.....	.....	.....
1883.....	29,281	.....	.....	.....
1884.....	24,663	.....	.....	.....
1885.....	36,511	.....	.....	.....
1886.....	21,620	.....	.....	.....
1887.....	22,560	.....	.....	.....
1888.....	38,707	.....	.....	.....
1889.....	37,559	.....	.....	.....
1890.....	29,687	.....	.....	.....
1891.....	30,753	.....	.....	.....
1892.....	24,338	.....	.....	.....
1893.....	26,288	.....	.....	.....
1894.....	29,637	\$27,530	\$3,448	\$24,082
1895.....	25,488	28,518	4,355	24,163
1896.....	36,512	25,366	4,156	21,210
1897.....	30,000	32,480	5,749	26,731
1898.....	36,569	33,880	5,377	28,503

The toll charged during the operation of the canal, as stated above, was at the rate of fifty cents per ton.

PORT ARTHUR SHIP CANAL. - 105.

The Port Arthur Ship Canal forms a part of the terminal arrangements of the Kansas City Southern Railway Company.

The canal extends along the shores of Sabine Pass to Port Arthur on Sabine Lake, Texas, being about forty-five miles east of Galveston, Texas, and two hundred and seventy-five west of New Orleans, La.

Sabine pass, connecting the Gulf of Mexico with Sabine lake, is itself about eight miles long and from twenty-five to thirty-three feet deep. It is being improved by the United States Government by jetties and continuous dredging.

The canal leaves the pass near Sabine Lake and extends along the west shore of the same about eight miles to the railroad terminal of the K. S. C. Ry.

The Port Arthur Canal and Dock Company is the direct owner of the tide-water terminals, dock, canal, etc., at Port Arthur.

The ruling section of the canal is one hundred and seventy-five feet wide at water-surface, seventy-five feet wide at bottom and the depth is twenty-five feet throughout.

UNITED STATES CANALS.

Abstracts from the United States Engineers' Reports.

HARLEM SHIP CANAL. - 106.

Before improvement the Harlem river had an available depth of ten feet from the East river to Morris dock, except at High

bridge where the depth was six feet. From Morris dock to Fordham landing there was a crooked channel seven feet deep, and above that point the river could be used only by vessels of small draught.

The existing project, adopted in 1878 and modified in 1886, provided for a continuous channel fifteen feet deep and four hundred feet wide, except at High bridge where it is only three hundred and seventy-five feet wide, and at Dyckman's meadow where, in a rock section, it is three hundred and fifty feet wide and eighteen feet deep.

In June, 1904, the depth was fourteen feet in the shoalest places and work is still in progress. The total cost of the work up to June, 1904, was \$1,318,246.

The total tonnage conveyed over the canal in 1890 was 3,380,000 tons, in 1893, 5,910,376 tons, in 1895, 7,500,000 tons, and in 1903, 6,910,386 tons. Of these amounts, however, the most was handled in the lower part of the river. The through freight in 1903 amounted to about 1,500,000 tons.

#### SANTEE RIVER CANAL, OR ESTHERVILLE AND MINIM CREEK CANAL. - 107.

This canal, connecting Winyah Bay with the Santee river, South Carolina, should not be confused with the old Santee canal, as their locations are entirely different and their purposes distinct.

The Santee river was connected with Winyah Bay through Mosquito creek in accordance with a project adopted in 1880 and at an expense of \$99,750.

In 1889 the project of constructing a canal from Estherville on Winyah Bay to Minim creek, an arm of the Santee river, was adopted and up to 1903, \$172,185 had been expended on it.

This canal replaces an old canal called Winyah Bay canal, but does not occupy the same site.

The Mosquito creek route, although replaced by the more recent project, has been preserved and may still be used for logs, timber rafts, etc.

On the Estherville Minim creek canal there is a navigable channel fifty feet wide and five feet deep, except at the Winyah Bay end, where, on account of the mud encountered, the width has been made only forty feet and the depth, five feet.

From 1891 to 1902 the average total tonnage conveyed over the canal was 133,500 tons.

#### THE LOUISVILLE AND PORTLAND CANAL. - 108.

One plan for a canal to overcome the falls of the Ohio at Louisville (the falls of the Ohio) was advocated about 1793. The State



of Kentucky, in 1825, granted a charter to a company for the construction of a canal, designed to enable navigation to avoid the dangerous passage of the falls. By acts of Congress, dated 1826 and 1829, the Federal Government became a party to the enterprise, taking shares of the company to the amount of \$233,500.

The canal was opened for traffic in 1830 at a cost of \$1,019,277. Being regarded from the beginning as a work of public utility more than as a commercial enterprise, it was always managed under State direction.

In eleven years the receipts from tolls surpassed the cost of the canal. The State employed this surplus revenue in purchasing the outstanding stock, and in 1855 the stock was all held by the State.

The company was invited to proceed with the enlargement of the canal and work on this enlargement was continued until 1868, when the funds gave out.

In 1868 the United States engineers went on with the work, which was completed in 1873 under the nominal control of the company. In 1874 the United States Government, in response to public opinion and the desire of the State of Kentucky, took entire control of and responsibility for the canal. During this period the Government had expended \$1,463,200. The total expenditure of the Government on this canal, from 1868 to 1904, amounted to \$3,726,448. No tolls were collected after the year 1880. The cost to the United States Government, up to 1890, was over \$2,600,000 above all receipts from the tolls collected.

In the years 1868-1887 the Indiana chute, so called, was made available for passing the falls at certain stages of the water, so that only a part of the commerce passing this point is forced to go down through the locks. The total amount expended on this project, up to 1887, was \$125,000 and the estimated cost of perfecting it, \$130,000.

The Indiana chute, so called, consists of two dams in the river proper with navigable passes, guarding dikes and dredged channel, the dams being, in part, of the movable type.

The tolls on the Louisville and Portland canal were in the beginning excessive, as much as twenty-five cents a ton being paid for the passage of freight. This toll was reduced to five cents per ton in 1872 by the United States Government against the protest of the company owning the canal, and finally all tolls were abandoned in 1880.

The number of vessels passing the canal in the year ending June 30, 1904, was 5,500, carrying 1,349,371 tons of freight and 14,305 passengers. In the same year 1,500 boats passed the falls by the open river, carrying 542,016 tons of freight.

The average tonnage for the past twenty years by both canal and open river, taken together, is about 2,000,000 tons yearly.

*Statement of Operations.*

Including traffic through the Indian chute.

Date.	Tons of freight.	Date.	Tons of freight.
1881-6.....	a662,615	1902.....	1,472,545
1886-1900.....	a1,854,053	1903.....	2,036,427
1900.....	1,588,705	1904.....	1,891,387
1901.....	2,222,683		

a = Average. No tolls are charged.

COOSA RIVER. - 109.

The Coosa river is formed at Rome, Ga., by the junction of the Oostenaula and Etowah rivers.

The Coosa has always been navigable for light draught boats from Rome, Ga., to Greensport, Ala., an estimated distance of one hundred and sixty-two miles, and this part of the river can be readily improved by channel works.

From Greensport, Ala., to Wetumpka, locks and dams are necessary in addition to channel works, in order to secure a navigable waterway.

From this point down to the junction of the Tallapoosa river, the river is navigable at all seasons.

In 1889 and 1892 a system of locks and dams was projected by Congress that should furnish slack-water navigation from Rome, Ga., to Wetumpka, Ala.

Of the entire proposed system of locks and dams, thirty-one in number, only three have been completed, situated .68, 3.86 and 5.24 miles, respectively, below Greensport. Lock No. 4, 25.89 miles below Greensport, is practically completed and the rest of the system may be abandoned.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.
1895.....	52,500	
1899.....	50,518	\$5,907 00
1900.....	33,776	
1901.....	77,760	
1902.....		22,638 00
1903.....	1,909	
1904.....	576	

## ILLINOIS AND MISSISSIPPI CANAL, OR HENNEPIN CANAL - 110.

This canal is intended to be a link in the waterway from Lake Michigan at Chicago to a point on the Mississippi river at the mouth of Rock river, four miles below the City of Rock Island.

This canal is being built by the National Government and has been reported as nearing completion for a number of years, but never as complete.

The canal begins one and one-half miles above the town of Hennepin on the Illinois river, extending thence sixty-two miles by the Bureau creek valley and over the summit to Rock river, near Colona, Ill.; thence by slack water down Rock river, eight and one-half miles, and by canal around the rapids in the lower part of Rock river, four and one-half miles, to the Mississippi river.

The total length of the canal, including the slack water, is seventy-five miles, and the total distance from Chicago to the Mississippi river by this route is one hundred and ninety-three and one-half miles.

The summit level of the canal is about eleven miles long and one hundred and ninety-six and four-tenths feet above the Illinois river. This ascent is overcome by twenty-one locks in a distance of forty-five and six-tenths miles.

The summit level is fed by a navigable feeder of the same size as the main canal and is twenty-nine miles long. The feeder conveys its supply from the Rock river, near Sterling, Ill. The feeder dam and locks extends a slack-water navigation on the Rock river up as far as Dixon, Ill.

The canal has been under construction since 1892 and may be completed in 1906; the total cost will be about \$8,000,000. The total expenditures on this project amounted to \$5,904,868 up to June 30, 1904. Four and one-half miles of the canal are completed, extending around the lower rapids of Rock river.

*Statement of Operations.*

Date.	Tons of freight.	Expenditures.
1899.....	18,682	.....
1900.....	6,238	\$4,806 00
1901.....	1,473	11,015 00
1902.....	.....	.....
1903.....	510	13,198 00

No tolls are charged.

## DES MOINES RAPIDS CANAL. - 111.

The project of a canal on the Iowa side of the Mississippi river, to overcome the rapids in the river at this point, was adopted in 1867. The canal was to be three hundred feet wide in embankment and two hundred and fifty feet wide in excavation, with a minimum depth of five feet.

The canal was completed and opened to navigation, according to the original plans, in 1877, but the improvement was not entirely completed until 1893, the total cost being \$4,574,900.

The traffic through this canal in 1902-3 consisted of six hundred and ninety-two steamboats and two hundred and twelve barges, carrying 33,382 passengers, 14,170 tons of merchandise and 23,921 bushels of grain. There also passed through the canal 18,940,636 f. b. m. of lumber, 2,850,000 feet of logs and about 7,000,000 lathes and shingles.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1878-91a.....	587,785	1903.....	34,829
1902.....	118,135	1904.....	47,440

a = Average. No tolls are charged.

## SAINT MARY'S FALLS CANAL. - 112.

This is probably the most important canal in the country if not in the world, having a greater tonnage through it each year than the great Suez canal.

This canal around the rapids, between Lakes Huron and Superior, is situated about sixty miles from Lake Huron and fifteen miles from Lake Superior.

The rapids or falls, about one-half mile long, have a descent in that distance varying from sixteen and one-half to twenty and one-half feet.

The first lock constructed here was on the Canadian side, built by the Hudson Bay Company in 1798. It was thirty-eight feet long, eight feet nine inches wide, with a lift of nine feet and a tow-path beside it for oxen to haul the bateaux and canoes through. This lock was destroyed by United States troops, from Mackinaw Island, under the command of Major Holmes, during the year 1814.

A canal and locks were next built, by the State of Michigan, on the American side, in the years 1853 and 1855. This is generally spoken of as the State canal. It was fifty-four hundred feet long and one hundred feet wide at the water-surface and thirteen feet deep.

There were two tandem locks, each three hundred and fifty feet long and seventy feet wide, with a lift of nine feet each. These locks were destroyed in 1888 to make room for the present Poe lock. Previous to this destruction, another and larger lock had been constructed about one hundred feet at one side of the old locks, and the channel preserved through the old locks, as well as through the new.

This new lock, called the Weitzel lock, was built by the United States Government in the years 1870-1 and was five hundred and fifteen feet long, eighty feet wide in the chamber, narrowing to sixty feet at the gates with seventeen feet of water on the sills.

The canal width was then increased to an average of one hundred and sixty feet and the stone slope walls were replaced with timber piers, having a vertical face. The depth of the canal at the same time was increased to sixteen feet.

In 1880 the canal was transferred by the State of Michigan to the United States, which, since that time, has operated the canal and improved it. No tolls have been charged since that date.

The Poe lock, eight hundred feet long, one hundred feet wide and having twenty-two feet of water on the sills, was built on the site of the old flight of two locks, parallel to the Weitzel and about one hundred feet east of it, in the years 1887 to 1896.

The depth of the water in the canal has been increased to twenty-five feet, and the entrance piers have been extended so that the total length of the canal is now one and six-tenths miles. The width is variable, being five hundred feet at the upper entrance, one hundred and eight feet at the movable dam, two hundred and seventy feet at the basin above the locks and one thousand feet at the lower entrance.

From the basin above the locks there are two distinct canal prisms, one leading to the Poe and one to the Weitzel lock.

The channel of the river below the locks has been improved so that it is now generally three hundred feet wide and twenty feet deep at mean stage.

The Poe lock can be filled or emptied in about seven minutes, and an unlockage of a boat three hundred and fifty feet long has been made in eleven minutes. The Weitzel lock can be operated in about the same time as the Poe lock.

The total expenditure on this canal, up to June, 1903, was \$4,026,796.

STATEMENT OF THE COMMERCE THROUGH SAINT MARY'S FALLS CANAL FOR EACH CALENDAR YEAR FROM 1881 TO 1904.

Years.	Date of opening canal.	Date of closing canal.	TONNAGE AND CLASS OF VESSELS.					FREIGHT TRAFFIC.			
			Sailing vessels.	Steamers.	Unregistered craft.	Total passengers.	Registered tonnage.	Passengers.	Coal.	Flour.	Wheat.
			Number.	Number.	Number.	Number.	Net tons.	Number.	Net tons.	Bushels.	Bushels.
1881.....	May 7	Dec. 5	1,706	2,117	181	4,004	2,082,757	24,671	235,647	605,463	3,758,985
1882.....	Apr. 21	Dec. 13	1,063	2,139	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1883.....	May 2	Dec. 11	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1884.....	May 23	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1885.....	Apr. 26	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1886.....	May 25	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1887.....	Apr. 25	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1888.....	May 7	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1889.....	Apr. 15	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1890.....	Apr. 20	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1891.....	Apr. 27	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1892.....	Apr. 18	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1893.....	May 1	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1894.....	Apr. 17	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1895.....	Apr. 25	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1896.....	Apr. 21	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1897.....	Apr. 21	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1898.....	Apr. 11	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1899.....	Apr. 25	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1900.....	Apr. 19	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1901.....	Apr. 20	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1902.....	Apr. 1	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1903.....	Apr. 2	Dec. 10	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985
1904.....	May 5	Dec. 13	1,458	2,620	972	4,074	2,082,757	24,671	235,647	605,463	3,758,985

<sup>a</sup> From 1895 figures include traffic through Canadian canal, which opened to commerce September 9, 1895; in 1904, the date of closing is for American locks.

STATEMENT OF THE COMMERCE THROUGH SAINT MARY'S FALLS CANAL FOR EACH CALENDAR YEAR FROM 1881 TO 1904—(Continued).

Years.	FREIGHT TRAFFIC—Continued.									
	Grain, other than wheat.	Manufactured and pig iron.	Salt.	Copper.	Iron ore.	Lumber.	Silver ore and bullion.	Building stone.	Unclassified freight.	Total freight.
	<i>Bushels.</i>	<i>Net tons.</i>	<i>Barrels.</i>	<i>Net tons.</i>	<i>Net tons.</i>	<i>B. M. feet.</i>	<i>Net tons.</i>	<i>Net tons.</i>	<i>Net tons.</i>	<i>Net tons.</i>
1881.....	367,838	87,830	63,897	29,488	748,131	58,877,000	.....22	1,400	129,031	1,567,741
1882.....	473,129	92,870	176,612	25,409	987,060	82,783,000	814	5,428	172,167	2,029,521
1883.....	776,552	109,910	170,868	31,024	791,732	87,131,000	9,731	2,405	191,571	2,267,105
1884.....	517,103	72,428	144,804	36,062	1,136,071	122,389,000	2,666	6,047	207,173	2,874,587
1885.....	422,981	188,845	136,355	31,927	1,235,122	127,384,000	2,009	8,189	184,963	3,256,628
1886.....	715,373	175,208	138,077	38,827	2,087,809	138,988,000	2,385	9,449	230,728	4,627,759
1887.....	715,368	174,919	104,008	34,886	2,497,713	135,226,000	3,350	13,401	344,586	5,494,649
1888.....	2,022,308	63,703	218,375	28,960	2,570,517	240,372,000	3,855	33,541	345,854	6,411,422
1889.....	2,133,245	57,561	168,250	33,456	4,085,855	315,554,000	8,947	33,838	312,410	7,516,022
1890.....	2,044,384	116,327	179,431	43,729	3,760,713	361,929,000	1,731	47,973	371,294	9,041,213
1891.....	1,032,104	69,741	234,528	69,160	3,560,213	512,844,000	2,470	44,080	417,993	8,888,759
1892.....	1,666,690	101,520	235,740	84,993	4,901,152	568,545,000	1,930	39,626	469,146	11,214,332
1893.....	2,405,344	89,452	228,730	87,530	6,014,556	722,783,000	412	19,428	451,185	13,185,860
1894.....	1,545,008	60,659	237,461	99,573	6,548,876	740,700,000	240	23,876	463,308	15,082,590
1895.....	8,328,694	100,337	269,919	107,452	7,909,250	684,988,000	.....5	17,731	520,851	16,239,081
1896.....	27,448,071	121,872	237,515	116,872	10,633,715	805,612,000	.....110	6,249	579,048	18,982,755
1897.....	24,889,688	135,164	295,449	122,324	11,708,960	895,485,000	.....487	4,670	623,146	21,234,684
1898.....	26,078,384	250,170	301,560	124,226	15,328,240	1,098,057,000	.....110	48,902	587,486	25,255,810
1899.....	30,000,935	214,585	316,338	120,060	16,443,568	1,099,651,000	.....1	46,884	541,397	28,643,073
1900.....	16,174,659	135,585	328,895	131,066	18,277,535	1,091,471,000	.....1	38,919	740,100	35,961,145
1901.....	24,760,547	206,443	443,774	98,601	18,090,618	1,091,471,000	.....1	38,919	740,100	35,961,145
1902.....	27,740,822	198,152	443,306	120,612	24,277,535	1,093,192,000	.....1	31,300	659,839	34,674,437
1903.....	32,095,646	193,267	454,882	112,877	21,654,898	1,093,192,000	.....1,356	27,093	732,009	31,546,106
1904.....	33,030,992	229,955	365,459	109,605	19,635,797	923,280,000	.....1,356	27,093	732,009	31,546,106

RESULTS OBTAINED FROM DISCUSSION OF TRAFFIC STATISTICS, SAINT MARY'S FALLS CANAL, 1888-1903. <sup>a</sup>

Seasons.	Total freight.	Valuation of freight.	Total ton-miles.	Total cost of transportation.	Average distance freight was carried.	Cost of carrying per ton-mile.	Value of American craft.	Value of Canadian craft.	Proportion of freight carried by Canadian vessels.
	<i>Net tons.</i>	<i>Dollars.</i>		<i>Dollars.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Dollars.</i>	<i>Dollars.</i>	<i>Per cent.</i>
1888.....	6,411,423	82,156,019	5,173,132,972	7,883,077	806.4	1.5	20,381,100	1,514,300	6
1889.....	7,516,022	83,732,527	5,960,646,352	8,634,247	790.4	1.5	25,328,600	1,597,600	4
1890.....	9,041,213	102,214,948	7,207,296,415	9,472,215	797.2	1.3	27,857,700	1,777,800	3.5
1891.....	8,888,759	128,178,208	7,282,462,269	9,849,023	820.4	1.35	31,947,300	2,119,500	4
1892.....	11,214,333	135,117,267	9,222,773,938	12,072,851	822.4	1.31	36,220,100	2,108,700	3.8
1893.....	10,796,572	145,436,957	8,980,310,540	9,957,483	831.9	1.1	39,017,400	2,115,700	4.1
1894.....	13,195,860	143,114,502	10,927,871,324	10,798,310	821.1	.99	41,124,200	1,939,800	3.5
1895.....	13,062,580	139,573,129	12,502,548,892	14,233,758	830.0	1.14	40,858,800	2,037,000	3.75
1896.....	16,239,061	195,449,842	13,532,641,776	13,511,615	836.3	.99	43,006,200	2,135,300	4
1897.....	18,982,733	238,233,927	15,969,693,576	13,222,099	841.3	.83	42,375,300	2,001,400	3
1898.....	21,234,065	233,069,740	17,891,597,030	21,125,060	842.9	1.79	45,199,900	2,491,800	3.2
1899.....	22,235,610	281,364,650	20,891,944,628	21,933,707	837.9	1.08	63,000,539	3,369,500	3.1
1900.....	23,043,073	297,064,839	21,329,239,017	23,217,674	825.2	1.08	55,346,553	3,318,500	3
1901.....	23,403,063	308,968,805	23,753,901,837	26,566,189	823.3	.89	57,545,000	3,792,400	4
1902.....	33,491,146	358,309,800	28,753,910,837	26,566,189	823.3	.89	57,545,000	3,792,400	4
1903.....	34,674,437	349,403,014	28,974,660,408	26,727,733	835.6	.92	58,252,800	6,384,500	6

<sup>a</sup> Figures for the calendar year 1904 not available.



PORTAGE LAKE SHIP CANAL,  
LAKE SUPERIOR SHIP CANAL,  
KEWEENAW BAY AND LAKE SUPERIOR WATERWAY. - 113.

Portage lake, situated in Keweenaw peninsula, is separated from Lake Superior by a narrow strip of land on the east and is connected with Keweenaw bay, an arm of Lake Superior by Portage river, extending in a southwesterly direction.

The canal, cut through the narrow strip of land separating Portage lake from Lake Superior, has proved an important link in the commerce of the lakes.

Originally, the canal was built by the Portage Lake and Lake Superior Ship Canal Company in the years 1868 to 1873. This company received Government aid in the form of a grant of land needed for the canal and 400,000 acres of public land.

The canal was sold to a new company incorporated in 1877 (The Lake Superior Ship Canal Railway and Iron Company). It was always an unprofitable affair, the expenses eating up the entire revenue.

Portage river, which connects Portage lake with Keweenaw Bay and forms a part of the through waterway, was canalized by a company entirely distinct from the company constructing the Portage canal. The company that canalized the river portion was called the Portage Lake and River Improvement Company. This company, incorporated in 1861, was entirely without State or Government aid, and took care of its own interests.

These two works were purchased by the Federal Government at a cost of \$350,000 for both.

Before purchase actually occurred, the United States had begun improvement. The canal, however, at the time of transfer, furnished only a crooked and badly lighted channel, with a narrow thirteen-foot navigation.

In 1903 the channel, for the most part, was nineteen feet deep and was then in process of being dredged to a depth of twenty feet. The bottom width of this channel is one hundred and twenty feet at present, and the depth, twenty feet.

The total cost of this improvement, to the Government, was \$1,295,238 up to June 30, 1904.

During the navigation season of 1902 the commerce passing through the canal amounted to 2,419,331 tons of freight, valued at \$65,326,819, and 47,987 passengers.

During the navigation season of 1903 the commerce through this waterway amounted to 2,346,310 tons of freight, valued at \$64,524,986, and 32,850 passengers. There was also a local business of 74,538 tons of freight valued at \$658,555.

From the commencement of the improvement by the United States, in 1891 to the close of the year 1903, the total freight

on this canal aggregated about 16,355,770 tons, valued at \$513,474,260, approximately.

#### SAINT CLAIR FLATS CANAL. - 114.

Before the Government commenced work here in 1855, boats were obliged to follow the natural delta outlet channels of the St. Clair river in order to get from the river to St. Clair lake.

Between 1855 and 1865 the Government spent \$45,000 in gaining one or two feet in depth through these delta channels.

In 1866 the plan was adopted of dredging a straight cut across the flats thirteen feet deep and three hundred feet wide. In 1871 the canal was completed according to this plan and in 1872 the deepening of the channel to sixteen feet and to a width of two hundred feet was begun. In 1886 work was again begun of deepening the channel to eighteen and twenty feet and widening it to two hundred and sixty feet. This work was practically completed in 1892, at which date it was incorporated into the twenty to twenty-one-foot ship channel and in 1896 announced as entirely complete, at a total cost up to that time of \$829,810.

The dredged material was deposited in dikes at each side of the channel, each dike being 7,221 feet long and protected by pile revetments. The clear width between the pile revetments was two hundred and ninety-five feet and there was a uniform depth of twenty feet.

In 1902 the construction of the second channel, three hundred feet long, at the side of the existing channel, was authorized and the work begun. This channel is to be uniform with the existing channel, and its purpose is to provide separate channels for ascending and descending boats in order to accommodate the large traffic passing this canal, which in the season of 1904 was 38,044,929 tons of 2,000 pounds, its estimated value being \$403,276,247.40.

#### *Statement of Operations.*

Date.	Tons of freight.	Expenditures.
1891-1902a.....	1,256,538	\$3,300-\$10,000
1901.....	2,116,624	8,500
1902.....	2,632,323	9,000
1903.....	2,420,928	.....
1904.....	2,397,553	.....

a = Average. No tolls are charged.

#### STURGEON BAY AND LAKE MICHIGAN CANAL. - 115.

This canal, built through one of the narrowest parts of the strip of land separating Green Bay from Lake Michigan, serves

a double purpose. It opens a shorter route between the south coast of Lake Michigan and the ports of Green Bay. It also provides, in Sturgeon Bay, a harbor of refuge for all lake craft.

In 1866, in order to encourage the building of this canal, the United States granted to the State of Wisconsin 200,000 acres of land, the proceeds of the sale of which were to be used in such construction.

The State, instead of taking up the work itself, made over the concession of land in 1868 to the Sturgeon Bay and Lake Michigan Ship Canal and Harbor Company.

This company bound itself to construct within three years, and to maintain a canal one hundred feet wide at water-surface and with a minimum depth of thirteen feet. Also, it was to provide an approach to the canal that would allow the safe entry of vessels in stormy weather.

The work was not finished until 1881 after various periods of abandonment. The work was not thoroughly done and the United States Government was forced to take charge of the harbor works at the entrance.

The canal was never in a satisfactory condition to serve its intended purpose till after 1893, when Congress took possession of the works and at once undertook their improvement.

The project now under way, adopted in 1902, provides for increasing the depth of the canal to twenty-one feet.

The maximum draught that could be carried in 1903 was fourteen and one-half feet in the canal and sixteen and one-half in the harbor; the canal was one hundred and sixty feet wide at water-surface in part and two hundred and fifty feet wide between revetments in the westerly thousand feet.

The commerce making use of the canal is varied and important.

The total expenditures of the National Government since 1872 amount to about \$600,000.

In the calendar year of 1902 there passed through the canal 638,835 tons of freight, valued at \$21,947,885, and 15,861 passengers.

#### *Statement of Operations.*

Date.	Tons of freight.	Expenditures.
1894.....	802,280	\$12,000
1895-9a.....	842,892	31,000
1900.....	858,474	29,943
1901.....	906,138	16,810
1902.....	638,835	7,345
1904.....	577,976	.....

a = Average. No tolls are charged.

## GALVESTON AND BRAZOS CANAL. - 116.

This canal was built in the years 1850 and 1851 to connect the natural waterways which lie along the coast between Galveston and the mouth of the Brazos river. The total distance is thirty-eight miles, of which only eight miles is canal proper.

In 1902 the canal was purchased by the United States for \$30,000, it being filled with mud and snags so that there was not more than fourteen inches or two feet of water in the shallow places.

The project now under way is that of securing a six-foot navigable channel throughout.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1891.....	4,000			
1898.....	36,569	\$33,880	\$5,377	\$28,503

## THE CASCADES CANAL. - 117.

Where the Columbia river passes through the Cascade range there is a narrow gorge, in which occur the rapids known as the Cascades of the Columbia. To get around these rapids is the purpose of the canal. The original project for a canal and locks at an estimated cost of \$2,544,545, adopted in 1877, was modified in 1888 to include the improvement of the channel below the falls so as to insure an eight-foot channel at all stages, with a lock four hundred and sixty-two feet long and ninety feet wide. This project was again modified in 1894 so as to provide for a second lock above the upper lock-gates.

The works were partially completed and were opened to navigation in the fall of 1896.

Counting the estimated amount necessary to complete this work, the total cost will be \$4,007,260.

The maximum draught that can safely pass the locks is about seven feet.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1897.....	18,812	1901.....	19,710
1898.....	16,700	1902.....	38,501
1899.....	17,710	1903.....	33,173
1900.....	22,426		

No tolls are charged.

## THE PANAMA CANAL. INTEROCEANIC CANAL - 118.

In 1879 an International Congress met in Paris and under the influence of M. de Lesseps recommended the building of a sea-level ship canal across the Isthmus of Panama. Immediately thereafter de Lesseps formed a stock company under the name *Compagnie Universelle du Canal Interoceanique* for the building of such a canal.

The work of construction was begun in 1881 and continued under the greatest difficulties until 1889. During this time large numbers of the employees of the canal company died from malarial and yellow fevers. Floods, landslides, tropical vegetation and labor troubles combined to discourage those in charge of the undertaking.

In order to make the building of the canal possible the company was obliged to relinquish the idea of a sea-level canal and adopt a plan involving the construction of locks. This change in plan was made in 1887 and the work was carried on according to the new plans for two years thereafter.

In 1889 the company's affairs became so badly involved that a commission was appointed to investigate the management of the enterprise. Gross frauds and extravagances were unearthed, effectually wrecking the old company, and not till 1894 was a new company formed to complete the canal. This company spent large sums of money in conducting engineering investigations, but did not accomplish much in actual construction.

The purchase of the new company's rights in 1903 by the United States Government for \$40,000,000, and the payment of \$10,000,000 to the Republic of Panama, put this project into the hands of the United States Government.

There are now under consideration several plans for the construction of the canal, by the commission appointed by the President. In the meantime the work of sanitation, the making of surveys and investigations, of railroad construction, and making of excavations are being vigorously carried on. The plans all consider a canal extending from Colon on the Atlantic to Panama on the Pacific. The canal is to be about forty-six miles long and the prism is expected to be one hundred and fifty feet wide on the bottom and thirty-five feet deep. The height of the summit level was for some time undetermined. A majority of the Advisory Board of Engineers were in favor of a sea-level canal, but Congress has decided in favor of a lock canal, and probably an 85-foot level will be adopted.

## UNITED STATES CANALIZED RIVERS.

Abstracts from the United States Engineers' Reports.

## CONGAREE RIVER. - 119.

In 1886 this river, in its original condition, had three- to four-foot navigation from its mouth to Columbia, S. C.

The plan, adopted in 1886, provides for securing a four-foot navigation throughout the lower forty-seven miles of the river.

In 1899 the construction of a movable lock and dam near Granby was authorized for the purpose of extending steamboat navigation to Columbia and \$162,218 was expended on these projects up to July 1, 1904.

## MONONGAHELA RIVER. - 120.

The project of canalizing the Monongahela river dates from 1828. In 1832 attempts were made to induce Congress to take up the work.

The Legislature of Pennsylvania authorized the formation of the Monongahela Navigation Company in 1836, which engaged to undertake the canalization of the river from Pittsburg to the State line (now West Virginia), a distance of ninety-two and three-tenths miles, and to continue the canalization into the State of Virginia as far as that State would allow.

The company was incorporated in 1837 and the work began in 1838.

Originally, the lift of all locks was limited by law to four and one-half feet, but the number required was so great that this limit was increased to eight and even, in one case, to ten feet. The number required between Pittsburg and the State line was in this way reduced to seven.

Two locks nearest to Pittsburg were put in operation in 1841, when severe damage to the work and the financial straits of the State of Pennsylvania hindered further operations. Finally the State was obliged to sell the stock of the Monongahela company, that it had held, for \$125,000. In 1844 the situation was improved, the works were repaired, the B. & O. railroad was built to Cumberland and Pittsburg was not reached by the Pennsylvania railroad until eight years later, 1852. These years were years of great prosperity for the Monongahela company as its works formed a part of the great National thoroughfare.

The capital stock of the company was doubled by act of the Legislature of 1848 and locks Nos. 1, 2, 3, 4, 5 and 6 were, by the aid of this additional capital, completed and in operation in 1856; lock 7 was not completed till 1880.

In 1872 the National Government undertook the extension of the slack-water system to Morgantown, W. Va., by building locks

8 and 9. These locks, in connection with the seven locks and dams of the Monongahela Navigation Company, enabled boats drawing five and two-tenths feet of water to navigate the river from its mouth to Morgantown.

In 1896 the United States acquired the seven locks and dams of the Monongahela Navigation Company under condemnation proceedings. The value of these works was set at \$3,761,615.46, which amount was appropriated for their purchase. The works were transferred in 1897 and the entire system was completed to Morgantown in 1899.

The project, adopted in 1897, provided for the construction of six additional locks and dams extending navigation to Fairmount, W. Va. (total estimated cost, \$1,200,000). There is also a project, adopted in 1899, for the rebuilding and enlargement of the old locks. Locks Nos. 10 to 15, inclusive, were opened to navigation in 1893 extending the slack-water system to Fairmount, as contemplated in the project of 1897. The enlargement of the old locks is incomplete.

Locks 1, 2, 3, and 4 are double locks each consisting of a large and a small lock, side by side.

The freight movement on this river is second only to that of the canal of Saint Marys, among the canals of the country, having developed rapidly from the beginning. The average receipts from tolls, as reported by the old company, are given here for certain five-year periods.

Year.	Average receipts from tolls.	Year.	Average receipts from tolls.
1845-1850.....	\$54,474	1875-1880.....	\$211,129
1850-1855.....	74,272	1885-1890.....	246,027
1865-1870.....	175,812		

#### *Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
<i>Old Canal Company.</i>				
1880.....	3,450,400	\$236,929 00	\$59,585 00	\$177,344 00
1889.....	3,874,022	257,665 00	78,117 00	179,548 00
<i>Enlarged by United States.</i>				
1895.....	4,555,703	\$309,473 60	\$115,189 65	\$194,283 95
1896.....	5,989,159			
1902.....	9,100,887			
1903.....	11,369,814			
1904.....	9,268,736			

## ALLEGHENY RIVER. - 121.

Prior to 1885 the Allegheny river was not navigable in low water, even by shallow craft. In that year the Davis Island lock and dam in the Ohio river, five miles below the mouth of the Allegheny at Pittsburg, was opened to traffic. This dam, when raised, afforded a navigable depth of about eight feet in the Allegheny river up to Garrison ripple, two miles above the mouth of the Allegheny.

Herr Island dam, located in the Allegheny one-half mile below Garrison ripple, was designed to prolong the slack-water navigation afforded by the Davis Island dam, along the remaining four miles of the frontage of Pittsburg on the Allegheny river.

The original plan was for a fixed dam and was adopted in 1890. The plan was subsequently changed so as to provide for a movable dam. The lock is of concrete and the dam comprises a five hundred-foot navigable pass of Chanoine wickets and two bear-trap weirs each, ninety-four feet long.

This lock and dam were completed in 1903 and have conferred immense benefits on the City of Pittsburg and the adjacent country.

In 1896 the river and harbor act provided for the construction of two other locks and dams in the Allegheny, one at Six Mile Island and one at Springdale.

These are to consist of fixed timber dams and concrete locks. When complete they will extend the slack-water navigation to Natrona, twenty-two miles above Herr Island dam.

The commerce on that part of the river under improvement was 2,293,429 tons in 1903, as against 1,688,000 tons in 1902.

## OHIO RIVER. - 122.

The Ohio river, formed by the junction of the Monongahela and Allegheny at Pittsburg, Pa., is of great importance as a waterway. Its total length from Pittsburg to Cairo, where it empties into the Mississippi, is nine hundred and sixty-seven miles, and a large number of important rivers join it along its course. While its importance is great, it has never been in good navigable condition and only when put into such shape can an accurate estimate be made of the volume of traffic seeking this outlet.

The system of improving this river by locks and dams was approved in 1875. The construction of the Davis Island dam, lock and dam No. 6 were provided for in 1890. The locks and dams Nos. 2, 3, 4 and 6 were provided for in 1896, Nos. 7 to 18 in 1899, and No. 19 in 1902.

Of these, only the Davis Island dam (No. 1 of the entire series) has been reported in operation. It has been in operation since



1885, when it was completed at a total cost of \$940,000. The others of the nineteen are in various stages of progress; No. 6 at Beaver, Pa., is practically complete. Others are just begun. When completed these locks and dams will insure, at all times of the year, a safe navigation for boats drawing six feet and less.

The total amount expended on the project up to June, 1903, was \$2,601,362, besides the amount spent on the Davis Island lock and dam.

*Statement of Operations.*

Date.	Tons of freight.	Expenditures.
1895.....	2,807,998	\$11,226 10
1896.....	3,811,759	26,190 77
1897.....	2,964,009	9,504 68
1903.....	4,724,838	43,267 74
1904.....	2,935,036	.....

MUSKINGUM RIVER. - 123.

The canalization of the Muskingum river was completed by the State of Ohio in 1840 and this canalized river was included in the State system of canals until 1887, when it was sold to the United States Government for \$1,500,000.

This cession was made in order to relieve the State of the expense of maintenance and did not, in fact, bind the National Government to any program of improvement.

The United States has, however, pursued a very liberal policy toward this river improvement and now has on this river a system of ten locks and dams, furnishing six-foot navigation from its mouth at Marietta, to Zanesville, a distance of seventy-five miles.

The original improvements by the State, consisting of eleven dams and twelve locks, extended to Dresden, but when taken over by the Government the works were in very bad repair. That part between Zanesville and Dresden was in utter ruins. The Government is now engaged in restoring this portion, and lock and dam No. 11 will probably be completed in 1907 or 1908.

The present project is for the National Government to restore the locks and dam necessary to extend navigation to Dresden and for the State to continue the canalization to Coshocton, a distance of thirty-three miles above Dresden, where it is proposed to connect the canal with the river improvement.

Of the ten locks now in existence on this river, it may be said that four of them are the old State locks repaired, which must soon be replaced by new structures.

*Statement of Operations.*

Date.	Tons of freight.	Receipts.	Expenditures.	Net earnings.
1840-1861.....		\$570,035 00	\$552,595 00	\$17,440 00
1873-1880.....		30,111 00	33,727 00	d3,616 00
1880.....	45,290			
1893.....	32,049			
1902.....	36,342			
1903.....	26,125			
1904.....	29,351			

d = Deficit.

## LITTLE KANAWHA RIVER. - 124 also - 91.

The lower part of this river was canalized, between the years 1867 and 1874, by means of locks and dams, by the Little Kanawha Navigation Company.

The dams and locks of this company, four in number, have never furnished a reliable navigable channel in periods of low water and are now entirely out of repair.

Above Burning Springs the canalization has always been carried on by the United States Government. The work so far has consisted of the building of one lock and dam and channel work.

The commerce passing the river is not at all what it could be if the four locks and dams, owned by the Navigation company, were in repair. Their leaky condition is largely responsible for the low water that often delays traffic. This condition, growing continuously worse, causes a decrease in the river trade that would undoubtedly increase largely under more favorable circumstances.

The only remedy seems to lie in the acquisition of the lower locks by the National Government and the repair of the entire system. Negotiations toward this end are now pending.\*

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
a1890-1902.....	141,394	1903.....	73,464
1902.....	69,706	1904.....	66,415

a = Average.

## GREAT KANAWHA RIVER. - 125.

In 1832 the James and Kanawha River Canal Company was formed and the Kanawha river was a part of their property, to be utilized as deemed advantageous in connection with their great canal project.

\*Purchased in 1906.

In 1858 the Kanawha Board and Kanawha River Improvement Company was created. This Board undertook the improvement of the river from Loop creek shoals to the river mouth, subject to the instructions of the James and Kanawha River Canal Company.

In 1869 West Virginia annulled all rights of the company to the Kanawha river and placed it entirely under the control of the Kanawha Board.

In 1875 West Virginia transferred to the United States all rights, etc., on the Kanawha river and its tributaries up to the mouth of Howard and Anthony creek. The original project of the United States Government, adopted in 1873 and modified in 1875, provided for obtaining a navigable depth of six feet the year round throughout the whole river, ninety-six miles.

This project provided for locks and movable dams up as far as Paint creek and fixed dams and locks above that point. Of twelve, the total number planned, ten have been constructed, Nos. 2 to 11, inclusive, one being omitted by improved plans and No. 1 being postponed.

The total expenditure on this project, up to June 30, 1904, was \$4,271,863.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1890-1902a.....	1,195,529	1904.....	1,150,494
1903.....	1,406,484		

a = Average.

**BIG SANDY RIVER, INCLUDING TUG AND LEVISA FORKS. - 126.**

In 1880 the construction of a lock and dam in Big Sandy river at Louisa, Kentucky, the junction of Tug and Levisa forks, was authorized by Congress. In 1899 two locks and dams were authorized in the Big Sandy between Louisa and the river's mouth.

In 1902 Congress authorized the completion of the locks and dams in the Big Sandy and of a lock and dam in both Tug and Levisa forks.

The work as yet is incomplete and only the lock and dam at Louisa are reported in operation in 1903.

The head of the projected system of slack-water navigation is at Pikeville on Levisa fork and at the mouth of Pond creek on Tug fork.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1896.....	543,403	1900.....	296,000
1897.....	412,000	1901.....	349,862
1898.....	415,400	1902.....	350,835
1899.....	443,403	1903.....	290,401

## GREEN AND BARREN RIVERS. - 127.

The former system of slack-water navigation on the Green and Barren rivers, comprising four locks in Green river, one lock in Barren river and a total length of pools of two hundred miles, was completed by the State of Kentucky in 1841.

The State retained control of the company until 1868, when it was leased to the Green and Barren River Navigation Company for a term of thirty years.

In 1889 the United States purchased the unexpired part of this lease and assumed possession of this system and all property and privileges pertaining thereto, for \$135,000.

The locks were then in bad condition and the approaches obstructed. The plan, adopted in 1889, was simply to restore the old condition and to rebuild where necessary.

Under date of August 11, 1891, the project of extending slack-water navigation to Mammoth cave was submitted to Congress. In conformity with this recommendation, one of the sets of locks and dams has been built and the site of the second selected. There are now five locks in Green river, with a sixth provided for, and one in Barren river.

The number of boats, rafts, etc., passing lock No. 3 has increased from nine hundred and one in 1889 to three thousand two hundred and forty-six in 1903, and while the tonnage for many years cannot be given, that of 1903 was without doubt the greatest up to that time. In the year 1903 the freight passing lock No. 3 amounted to 457,386 net tons.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1903.....	487,688	1904.....	414,798

## KENTUCKY RIVER. - 128.

This river was canalized below Clear creek to its mouth by the State of Kentucky in the years 1835-1845. Five locks and dams

were built, giving a navigable depth of six feet for ninety-five miles, except in low water.

The United States Government took over these works in 1880, at which time all five locks and dams were in a dilapidated and almost worthless condition.

The project, adopted by Congress in 1879, and yet unfinished, provided for the rebuilding and repairing of the five old locks and the extension of slack-water navigation up stream to Three Forks, a distance of two hundred and sixty-one miles from the mouth of the river, at Carrollton, Ky.

In 1904, \$2,479,612 had been expended and six-foot navigation had been extended to lock and dam No. 10, a total distance of one hundred and seventy-six miles.

In order to complete the project, locks and dams Nos. 11, 12, 13 and 14 will be necessary and the total cost will exceed, by a large sum, the amount authorized.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1902.....	350,935	1904.....	305,892
1903.....	290,399		

No tolls are charged.

**ROUGH RIVER. - 129.**

Formerly a lock and dam had existed on this river, built by the Rough River Navigation and Manufacturing Company. At the time the United States undertook the improvement of the river, these works were in ruins and all rights forfeited.

The lock and dam, built by the Government, is located about eight miles above the mouth of the river and the head of navigation is about twenty-one and one-half miles farther up the river, a short distance above Hartford, Ky. This navigation is for boats of four feet draught, although the locks will permit the passage of boats of greater draught.

This project, begun in 1885, was completed in 1896 and cost, up to 1903, \$103,175.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1898-1903a.....	25,669	1904.....	35,446
1903.....	32,919		

No tolls are charged. a = Average.

## TENNESSEE RIVER. — 130.

The Tennessee river is six hundred and fifty-one miles long and, with its principal tributaries, forms a system of internal waterways capable of being navigated more than thirteen hundred and fifty miles by steamboat.

The improvement of this river has been carried on for one hundred and eighty-eight miles above Chattanooga, but the locks and dams are below that point.

In the two hundred and thirty-seven miles below Chattanooga down to Riverton there are a number of short canals around shoals in the river.

Below Riverton there are two hundred and twenty-six miles, in which only three and one-half feet could be originally regarded as the ruling depth. This is now being dredged so there shall be a channel at least one hundred and fifty feet wide and at least five feet deep.

Between Chattanooga and Riverton there are canals at Big Muscle shoals, Little Muscle shoals, Elk River shoals, Coldbert and Bee Tree shoals. These are all to be from seventy to one hundred and twenty feet wide and six feet deep.

The canal at Big Muscle shoals is fourteen and one-half miles long, at Elk River shoals, three and one-half miles long, at Little Muscle shoals, three miles long, and past the Colbert and Bee Tree shoals the canal is to be eight miles long.

Of these the Big Muscle shoals and the Elk River canals are complete. Pending the completion of the other canals a good deal of money has been spent in improving the river navigation proper, to enable vessels to pass the shoals; but this navigation has never been satisfactory. Canalization of much more of this section of the river is necessary to satisfactory navigation, but is not justified at present by the trade requirements of the region.

The work so far done is of a high order and the traffic that passes the canals has no difficulties in that part of its route, but only in the river portions.

The total amount expended up to June 30, 1904, above Chattanooga, was \$473,942; between Chattanooga and Riverton, \$4,616,995, and below Riverton, \$293,843.

The culverts in the locks in these canals are all four and one-half by six feet and the average time of a lockage is only seventeen minutes.

The United States has in these canals, eleven locks, one steel aqueduct, sixteen miles of canal trunk and embankment, one dry dock, forty-two buildings of various kinds, one hundred and twenty-eight acres of land, dredges, steamboats, etc. The state-

ment is made that this plant is adequate to handle ten times the present commerce without increased cost. In order to develop this commerce it will be necessary to spend considerable sums in improving the lower reaches of the river, where the present condition of the river discourages the use of the improved and canalized part above.

*Statement of Freight Passing Through the Canals.*

Date.	Tons of freight.	Date.	Tons of freight.
1897.....	5,119	1902.....	7,712
1898.....	10,264	1903.....	10,023
1899.....	14,319	1904.....	10,562
1900.....	14,881		

No tolls are charged.

**BLACK WARRIOR, WARRIOR AND TOMBIGREE RIVERS. - 131.**

**BLACK WARRIOR RIVER, ALA.**

The original project for this improvement was adopted in 1887, the object being to obtain a channel for barges of six-foot draught at low water, all the year round between Tuscaloosa and Daniels creek, fourteen and one-half miles above, by means of five locks and dams at an estimated cost of \$741,670.<sup>1</sup>

Work so far done has been the completion of locks Nos. 10, 11, 12, and the bulk of masonry of lock No. 4 to be known as No. 13. Six-foot navigation can be carried nine miles above Tuscaloosa to lock No. 4. Beyond this there has been no improvement. The total amount expended up to June, 1904, was \$781,783.

The original project, dated 1875, for the improvement included only channel improvements, snagging, dredging and wrecking.<sup>2</sup>

The present project, adopted by the river and harbor act of 1899, is for the construction of six locks and dams of a total lift of sixty feet, and to afford a channel for barges of six-foot draught at low water, the year round, the estimated cost is \$1,534,000. Three of the six locks are completed and navigation is thereby opened for a distance of seventy-nine miles below Tuscaloosa.

By the river and harbor act of 1902 the securing of a six-foot channel from the mouth of the Tombigbee river to Demopolis, by means of locks and dams, was made a part of the project for improving Black Warrior, Warrior and Tombigbee rivers.<sup>3</sup>

Two more locks above Tuscaloosa would extend navigation twenty-five miles into the coal fields and should be built. The

<sup>1</sup> *Black Warrior river.*

<sup>2</sup> *Warrior river.* (This name refers to that part of the Warrior between Tuscaloosa, and Demopolis, where it flows into the Tombigbee.)

<sup>3</sup> *The Tombigbee river.*

whole project will afford navigation for three hundred and sixty-two miles in Warrior river, from Demopolis, where it empties into the Tombigbee, and over one hundred and seven miles in Tombigbee river.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1902.....	13,177	1904.....	14,625
1903.....	32,136		

OUACHITA AND BLACK RIVERS. - 132.

Under provisions of the river and harbor act of 1902, the improvement of these rivers has been commenced on an extensive scale.

The project approved and authorized contemplates the construction of nine locks and movable dams to provide a navigable depth of six and one-half feet from the mouth of Black river, Louisiana, up to a point ten miles above Camden, Arkansas, a total distance of three hundred and sixty miles, and at an estimated cost of \$1,998,576.

ILLINOIS RIVER.\* - 133.

The plan of the National Government for extending the slack-water navigation begun by the State of Illinois, from Copperas creek locks to the Mississippi river, was adopted in 1880.

It provided for the construction of two locks three hundred and fifty feet long between sills, seventy feet wide and having seven feet of water on sills. It provided also for securing a channel seven feet deep throughout.

The lock and dam at Kampsville, Ill., thirty-one miles above the mouth of the river, has been completed and in use since 1894, and that at La Grange, seventy-nine miles above the mouth, since 1890.

The cost of work to June, 1903, was \$1,471,251.\*

The tonnage conveyed over the river from 1894 to 1900 averaged 164,690 tons per year and the total tonnage for 1902 was 145,489.

GALENA RIVER. - 134.

In 1890 the City of Galena was authorized to improve the river and to construct a lock and dam, for which the United States Government agreed to pay \$100,000 after one year's maintenance by the city. This sum was paid in 1894 and the works passed into the hands of the United States.

\* See also, Illinois and Michigan canal.



The traffic is small and remains about the same each year. In the years 1902-3, the lock was open for navigation two hundred and thirty-five days and there passed through, fourteen hundred and fifty-two passengers and six hundred and sixteen tons of merchandise.

The draught that can be carried at extreme low water is two feet.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1900.....	807	1902.....	1,714
1901.....	616		

WABASH RIVER. - 135.

The Wabash Navigation Company, chartered by Indiana and Illinois in 1846 and 1847, respectively, was given the right to improve the Wabash river for two hundred and fifty miles from its mouth and to collect tolls thereon, provided that the first work done should be the construction of a lock and dam at Grand Rapids. The State also reserved the right to make the navigation free under certain conditions.

This company built a lock and dam at Grand Rapids, but did nothing else to improve navigation on the river. The dam was ten hundred and thirty feet long, fifty-seven feet wide, ten feet high, of cribwork filled with stone. This company spent at this point, \$105,000.

In 1873, the lock and dam being in a badly decayed condition, the company offered to transfer its property to the United States and in 1874 the Government obtained possession on the payment of \$7,000.

Since the works have come under the control of the Government considerable channel work has been done at a cost of \$469,526, and the lock and dam at Grand Rapids have been rebuilt and opened in 1893. In 1903 about three hundred boats passed through this lock.

Recently this project has been disapproved by the River and Harbor Board.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1897-1902.....	a3,295	1902.....	2,030
1901.....	2,448	1903.....	4,370

a = Average.

## OSAGE RIVER. - 136.

The construction of a lock and dam near the mouth of the river was authorized in 1890 at an estimated cost of \$325,000.

The work actually cost about \$500,000 and was completed in 1904.

## UPPER WHITE RIVER. - 137.

This project, adopted in 1899, is to provide slack-water navigation from Batesville, Ark., to Buffalo shoals, a distance of eighty-nine miles.

This is to be accomplished by means of ten fixed dams with concrete locks at an estimated cost of \$1,600,000. Of this amount only about \$500,000 has been spent so far and the work is far from completion.

In 1903 the total tonnage passing through the canal was 29,000 tons.

## FOX RIVER. - 138.

This canal, consisting of a short canal and a long canalized river, is sometimes separated into two canals, the first named being known as the Portage canal and the latter as the Fox River improvement.

The Wisconsin river, a tributary of the Mississippi, and the Fox, which flows into Lake Michigan, pass near each other in the upper part of their courses, running in opposite directions.

These rivers were rendered navigable only after considerable work in the way of river improvement, and the building of a canal two miles long across the summit between the two rivers was necessary in order to connect the two waterways.

The work was undertaken by the State of Wisconsin with the assistance of the National Government which granted the State, in 1846, about 691,200 acres of land along the course of the canal and rivers. This grant was to be used as Government aid in the building of the waterway.

The portion of this waterway that is a true canal, extends from Portage City on the Wisconsin river to Fort Winnebago on the upper Fox, and both rivers are canalized by means of locks and dams.

After having expended more than \$400,000, the State of Wisconsin, in 1853, sold the incomplete works to the Fox and Wisconsin Improvement Company. This sale included the land granted to the State by the National Government.

The work was completed by this company and put in operation in 1856.

The completion of competing railroads caused almost complete abandonment of this route, which had never been brought

into good condition, the portions of the route lying in the Wisconsin river being in an extremely unsatisfactory condition.

In 1866 all the rights and properties of the old company were sold to a new company, called the Green Bay and Mississippi Canal Company.

The United States took possession of this waterway in 1872, paying for it, \$145,000. The company reserved all land and other property not necessary to navigation.

The earliest project, that of 1848, called for canals forty feet wide at bottom and four feet deep, with locks one hundred and twenty-five feet long and thirty feet wide; these dimensions were subsequently enlarged.

The present project is one adopted in 1884 and modified in 1886. It provides for deepening and widening the channel of the Fox river from Green Bay to Montello to six feet deep and one hundred feet wide, and from Montello to Portage to a four-foot depth. It provides also for the renovation of twelve old locks.

The amount expended by the National Government from 1867 to 1903 on this and former projects was \$3,105,906. The result of this expenditure was the construction of the eighteen new stone locks, nine composite locks, sixteen permanent dams, thirteen canals, a headwall and feeder at Appleton, the construction of various buildings, culverts, guard-gates, a dry dock and the deepening of the channel in many places.

The greatest draught that could traverse the Fox river and the canal was three and one-half feet in 1903.

The improvement of the Wisconsin river by wing-dams was abandoned in 1887.

Tolls were collected by the United States Government during the years 1872-1882, when they were discontinued.

They amounted to from \$300 to \$3,000 a year as follows:

Date.	Totals.
1872.....	\$1,893 27
1873.....	1,239 17
1874.....	364 96
1875.....	385 23
1876.....	653 36
1877.....	2,168 99
1878.....	2,993 58
1879.....	2,726 08
1880.....	2,336 99
1881.....	2,100 40
1882.....	625 00

*Statement of Operations.*

Date.	Tons of freight.	Expenditures for operation and maintenance.
1889.....	346,475	.....
1895.....	229,109	\$50,225
1896.....	148,110	66,317
1900.....	309,800	66,553
1902.....	265,298	68,483

No tolls are charged.

## MISSISSIPPI CANAL. — 139.

St. Paul to Minneapolis.

In its natural condition the channel of the Mississippi river in this portion can be navigated in low water only by very small boats.

The project, under which the work is now being done, was adopted in 1894 and since that time the work has progressed with some modifications and much delay.

The project calls for two locks and dams and will insure a satisfactory slack-water navigation between these points.

The amount expended up to 1903 was \$602,134, about one-half the total estimated cost, with less than half the work done.

## YAMHILL RIVER. — 140.

The Yamhill river rises in the Coast range and joins the Willamette, about forty miles above its mouth.

In 1896 the construction of a lock and dam was authorized to provide three and one-half-foot navigation from its junction with the Willamette to McMinnville.

On this work \$247,747 was expended up to June, 1903.

*Statement of Operations.*

Date.	Tons of freight.	Date.	Tons of freight.
1901.....	2,455	1903.....	800
1902.....	1,747	1904.....	3,394

No tolls are charged.

## BAYOU LAFOURCHE, LA.

Bayou Lafourche is an outlet of the Mississippi river, forming a junction 70 miles above New Orleans. It is about 105 miles long and flows into the Gulf of Mexico. In its original condi-

tion it was obstructed by logs, snags, and overhanging trees. The project of 1879 provided for the removal of such obstructions to improve low-water navigation. Work under this project was carried on until 1885 with appropriations aggregating \$30,000.

The project of June 11, 1886, provided for the construction of a lock to connect the Bayou with the Mississippi river and for dredging a channel 75 feet wide and 5 feet deep at mean low water at an estimated cost of \$450,000, and \$8,000 annually thereafter for maintenance. Work under this project, owing to the inadequacy of appropriation, was confined to dredging, and nothing was done concerning lock construction.

On September 23, 1896, the project of 1886 was modified by holding in abeyance the provision concerning lock construction and restricting operations to dredging for the maintenance of low-water navigation at an estimated cost of \$25,000 per annum. Under this project operations were carried on in 1897 and 1898 and about 38 miles of channel improved. From the last-named date to June 30, 1905, dredging operations were carried on at an aggregate cost of \$257,990.74.

The river and harbor act of June 13, 1902, directed an examination and survey for a lock and dam at the head of the Bayou, to be constructed at the expense of certain State levee boards in accordance with plans and specifications approved by the Secretary of War. Plans were approved by the Secretary of War, who also granted permission, under certain conditions, for the construction of a temporary dam. Detailed plans for the lock were approved by him on Nov. 20, 1903, and subsequently modified with reference to construction of guard-gates. By joint resolution of Congress, approved April 13, 1904, the time for the removal of this temporary dam and the construction of the locks was extended for an additional period of three years.

## THE CANALS OF CANADA.

### THE ST. LAWRENCE CANALS.

The canals which constitute the Saint Lawrence system serve to overcome the rapids which lie between Montreal and the eastern end of Lake Erie. They have a combined length of  $70\frac{1}{2}$  miles and a total lockage of 533 feet. Named in order from the east, the canals of the Saint Lawrence system, are: the Lachine, the Beauharnois, the Soulanges (which to a very large extent replaces the Beauharnois), the Cornwall and the Williamsburg. The Farrans Point, the Rapide Plat and the Galops canals comprise the Williamsburg canal. The Welland canal, connecting Lakes Ontario and Erie, is considered a part of the Saint Lawrence system, as is also the smaller Murray canal.

### THE LACHINE CANAL. — 141.

The Lachine canal was built for the purpose of enabling vessels to pass the rapids of St. Louis, better known as the Lachine rapids, situated just above Montreal, the head of ocean navigation on the Saint Lawrence river. In 1815 an appropriation was made for its construction but no work was done at that time; later, in 1819, a private company was incorporated for the purpose of constructing the canal. This company, in turn, failing to act, a bill was passed in 1821 which repealed the act of incorporation and authorized the construction of the canal by the Government, which at once commenced construction. The British Government contributed £10,000 toward the accomplishment of this work. The canal was opened for navigation in 1825 and completed in 1826. The cost of construction amounted to \$438,404. The canal was built with a depth of four and one-half feet. The width at the water-surface was forty-eight feet and at the bottom twenty-eight. The locks were one hundred feet long and twenty feet wide.

These dimensions were found inadequate and enlargement of the canal was begun in 1840. During enlargement, navigation was not interrupted, the new locks being constructed beside the old ones, and the prism excavated during the closed season. This enlargement was sufficiently complete in 1848 to admit the passage of boats drawing eight and one-half feet of water, but the entire enlargement was not completed until 1862. The dimensions of the canal were then one hundred and twenty feet at water-surface and eighty feet at the bottom, with a navigable depth of nine feet. The locks were 200 feet long, 45 feet wide

and nine feet deep on the sills, except the two just above Montreal, which were 16 feet deep on the sills. The cost up to this time was \$2,587,532.

In the year 1871 it was decided to further enlarge this canal, together with the others in the Saint Lawrence system, in order to afford a navigable depth of twelve feet throughout. Before the work was undertaken, however, it was decided to make the depth nineteen feet, but this intention was never carried out. The prism was enlarged, first to a depth of twelve feet throughout, and then to fourteen feet. Two of the locks have a depth of eighteen feet on the miter-sills, and three, a depth of fourteen feet. The canal prism was not available for boats drawing fourteen feet of water until 1899. The old locks with nine feet of water on the sills are still available at the side of the new locks.

The total cost of construction on this canal, including all enlargements, etc., up to 1905, was \$11,475,112.

#### BEAUHARNOIS CANAL. - 142.

This canal, built to overcome the "Cascades," "Cedar" and "Coteau" rapids, is, in its entirety, 12 miles long and affords safe navigation between Lakes St. Francis and St. Louis.

After a number of projects had been considered as to the best route for this canal, in the year 1842, contracts were entered into for its construction on the south side of the river. The canal was completed in 1845, but was not found satisfactory. The channel was crooked and during low water was too shallow. For many years the canal was repeatedly improved by means of dams, regulating weirs and dykes, but was never entirely satisfactory. Now that the Soulanges canal is opened the Beauharnois canal will probably be abandoned.

The total amount expended for construction on this canal to 1905 was \$1,636,690.

#### SOULANGES CANAL. - 143.

The largest canal of the Saint Lawrence system, and the most modern in its design and execution, is the Soulanges canal. This canal is on the north side of the river and serves the same purpose as the Beauharnois canal, which to a large extent it replaces. The canal is 14 miles long and the five locks in that distance have a total lift of 82 feet. The locks are of concrete, faced with cut stone, and are filled and emptied through culverts communicating with the lock-chamber through twenty cast iron pipes arranged ten on each side of the chamber. These pipes are each 2½ feet in diameter. The gates and the sluices

are operated by electricity and a lockage can be accomplished in fifteen minutes or less.

The canal opened to traffic in 1899 after the expenditure of \$5,098,260 in construction. The total cost of construction to 1905 was \$6,886,174.

#### CORNWALL CANAL. - 144.

The Cornwall canal, located west of the Beauharnois, was built with a depth of nine feet and was the first canal constructed of this depth, which afterwards was adopted as the standard. It is designed to furnish a passage around the Long Sault rapids, being on the north shore of the river. It is about 11 miles long and has a lockage of 48 feet.

In 1818 a joint commission was appointed by the Government of Upper and Lower Canada, which reported in favor of the improvement of the Saint Lawrence navigation between the head of Lakes St. Louis and St. Francis and also at the rapids above Lake St. Francis. It recommended the building of canals four feet deep, but nothing was accomplished.

In 1832 the Assembly of Upper Canada passed measures appropriating \$280,000 for the improvement of the Saint Lawrence, so as to permit navigation by vessels drawing nine feet of water. This measure stipulated that the Cornwall canal should be completed before the other proposed works leading to Ontario were undertaken. In 1833 a commission was appointed to carry on the construction of the canal; in 1834 the contracts were let. The rebellion and other causes retarded the work, the canal being opened in 1842 and completed in 1843. The canal was nine feet deep, 150 feet wide at water-surface and 100 feet wide on the bottom, except in those places where the down-going craft ran the rapids and only the up-bound boats used the canal; there the canal was only 50 feet wide on the bottom.

In order to make this canal navigable for vessels of the same class as those passing through the Welland canal, its enlargement was begun in 1876. This improvement was a part of a general plan to extend 14-foot navigation from the Great Lakes to the sea. The new locks, begun at this time, are 270 feet long, 45 feet wide and have a depth of 14 feet on the miter-sills at low water. The work of improving the channel between the locks has been continuous since 1876. The amount expended on this canal before the confederation of the provinces was \$1,933,153, and the total cost to 1905 was \$7,181,188.

#### THE WILLIAMSBURG CANALS. - 145, 146, 147.

The Farrans Point, the Rapide Plat and the Galops canals are all on the north side of the river and complete the list of canals leading to Lake Ontario. These canals were built between



the years 1843 and 1856. The object of these, as of the other St. Lawrence canals, was to provide a route around rapids in the river.

The Farrans Point canal is situated about five miles west of the town of Dickinson's Landing—the head of the Cornwall canal. It was about three-quarters of a mile long with only  $3\frac{1}{2}$  feet of lockage, and was opened to traffic in 1847. The enlargement of the canal, to accommodate vessels drawing 14 feet of water, was contracted for in 1897 and was wholly completed in 1901. By this enlargement the length of the canal was increased to 1 mile and the lockage to four feet. A "flotilla lock," 800 feet long and 45 feet wide, with 14 feet of water on the miter-sill, was built at the side of the old nine-foot lock, which was retained and repaired.

The Rapide Plat or Morrisburg canal, situated about  $9\frac{1}{2}$  miles west of Farrans Point canal, is designed to overcome the rapids of Rapide Plat by a lock of  $11\frac{1}{2}$  feet lift. It extends from the village of Morrisburg to Flaggs Bay, a distance of  $3\frac{1}{3}$  miles. The work of enlarging this canal from the original nine-foot depth to the present depth of 14 feet was begun in 1884. The work on all portions was completed in 1905. The new lock, 270 feet long, 45 feet wide, with 14 feet of water on miter-sills, is built at the side of the old one, which is still preserved and was repaired for the use of vessels drawing less than nine feet of water.

Between the head of the Rapide Plat canal and the foot of the Galops canal there are  $4\frac{1}{2}$  miles of river navigation. What is now known as the Galops canal was originally built in two sections and was opened to navigation in 1847 for nine-foot navigation. The easterly section, called the Point Iroquois canal, commenced at the village of Iroquois and extended to Presqu'île, a distance of three miles. The lockage of this portion was  $5\frac{1}{2}$  feet. The westerly section, the original Galops canal, commenced at the village of Cardinal and extended up-stream two miles to the head of the Galops rapid. About ten years after these canals were built they were connected by an embankment in the river called the "Junction canal." All of these are now included under the one name of Galops canal, having a total length of  $7\frac{1}{3}$  miles and a lockage of  $15\frac{1}{2}$  feet. In 1888 the upper entrance was improved and in 1897 the enlargement of the remainder of the canal was commenced. This enlargement is intended to furnish 14-foot navigation and is practically completed, with only one lift-lock at Iroquois.

The total cost of the original construction of the Williamsburg canals was \$1,320,655, and the total cost of construction to 1905 was \$10,185,853.

## THE MURRAY CANAL. - 148.

The Murray canal extends through the Isthmus of Murray connecting the Bay of Quinte and Lake Ontario, thus enabling vessels to avoid the open lake navigation. It is 5 1-6 miles long, has no locks and its minimum depth is eleven feet. The total cost of this canal to 1905 was \$1,248,820.

## THE WELLAND CANAL. - 149.

The Welland canal, connecting the western end of Lake Ontario with the eastern extremity of Lake Erie, is counted as one of the St. Lawrence system. The project of building a canal to allow the passage of vessels around Niagara falls was advocated as early as 1816 and from that time until 1824 various schemes were discussed. In that year the Welland Canal Company was incorporated to connect the two lakes by means of a canal and railway. This company began work in 1825 with a capital of \$800,000, but its history was one of financial embarrassment. In 1833 the canal, without any railway, was completed from lake to lake, the company having received extensive aid from the government of Upper Canada and from the Imperial Government.

In 1837 the Government of the United Provinces converted its holdings of the bonds of the Welland Canal Company into stock and in 1841 purchased the remainder of the outstanding stock of this company, thereby gaining complete control of the canal. The locks were of wood, 100 feet long, 23 feet wide, with about eight feet of water on the miter-sills. The Board of Works, taking charge of the canal at this time, undertook at once the replacing of the wooden locks with structures of stone. The new locks were to be 120 feet long, 24 feet wide and were to have 8½ feet of water on the miter-sills. In 1843 it was decided that the locks should be 150 feet long, 26½ feet wide and that the depth on the miter-sills should be nine feet; also that the two entrance locks should have 11½ feet of water on the miter-sills. In 1853 the depth of the canal prism was increased to ten feet and the bottom width, in earth sections, to 50 feet.

In 1871 the enlargement of this canal, so as to admit vessels drawing 12 feet, was decided upon and in 1876 the proposed depth was increased to 14 feet. The canal was opened for 14-foot navigation throughout its length in 1887. As enlarged, the canal consists in part of an entirely new route, the old line being maintained also, so that now there are two channels available for a portion of the length. The new line is 26¾ miles long, while the old is 27½ miles long. From Allenburgh to Port Colborne, a

distance of 15 miles, there is only one channel, the old canal having been enlarged to the new dimensions.

The total cost of construction to 1905 was \$26,080,366.13.

#### SAULT STE. MARIE CANAL. — 150.

The Canadian canal around the rapid of St. Mary's river, between Lakes Huron and Superior, is usually called the Sault Ste. Marie, and the American canal, the St. Mary's, so as to distinguish them.

The first canal on the Canadian side was built in 1796-8 by the Hudson Bay Company in about the same location as occupied by the present canal. There was but one lock, 38 feet long, 8 feet 9 inches wide and with a 9-foot lift. There was a tow-path at the side and oxen were used to tow bateaux through the lock. This lock was destroyed in 1814 by United States troops.

The present Canadian canal is about 5,967 feet long, 150 feet wide and 22 feet deep. There is but one lock, 900 feet long, 60 feet wide and 22 feet deep. The work was begun in 1888 and completed in 1895. There are no tolls on this canal and none on the canal on the American side. The division of traffic between them is controlled by the convenience of the moment only, and is without special significance. It is customary, therefore, to give simply the total traffic through both canals, and that rule has been followed here. (See St. Mary's canal for statement of traffic.)

The total cost of construction to 1905 was \$4,423,676.

#### THE OTTAWA CANALS.

Some of the canals formerly included under the title of "The Rideau System," are now called the "Ottawa Canals." They are the Ste. Anne's Lock, the Carillon, the Chute-a-Blondeau and the Grenville canals. These, together with the Rideau, make possible a route extending from the harbor of Montreal to the port of Kingston on Lake Ontario, including in the route the Lachine canal and the navigable section of the lower Ottawa river. The Carillon, the Chute-a-Blondeau and the Grenville canals were originally referred to as the "Military Canals," having been projected after the War of 1812, to give a water route other than the St. Lawrence. They were constructed by the Imperial Government and in 1857 were transferred to the Government of Canada.

#### THE STE. ANNE'S LOCK. — 151.

The Ste. Anne's lock was constructed to enable vessels to pass the Ste. Anne rapids at the mouth of the Ottawa river. The work was recommended to the Parliament of Lower Canada in 1831,

but was not begun until 1840. The canal was completed in 1843, but since that time there have been various enlargements. The total cost to 1905 was \$1,170,216.

THE CARILLON CANAL. - 152.

The Carillon canal is 27 miles from the Ste. Anne's lock and is on the north side of the Ottawa river. It was projected in 1819 and completed by the Imperial Government. The work of enlargement was begun in 1873 and completed in 1882.

THE CHUTE-A-BLONDEAU CANAL. - 153.

The Chute-a-Blondeau canal is four miles up the river from the Carillon canal, a cut through rock on the north side of the river. No walls were built, except to receive lock-gates.

THE GRENVILLE CANAL. - 154.

The Grenville canal is 1 3-8 miles beyond the Chute-a-Blondeau canal. It is also on the north side of the river and was built to overcome the Grenville rapids. The enlargement of this canal was begun in 1871 and completed in 1887. The total cost of the Carillon and Grenville canals to 1905 amounted to \$4,182,093. The first boat passed through this system of canals in 1835.

THE RIDEAU CANAL. - 155.

The Rideau canal formerly included with the Ottawa canals under name of the "Rideau System," extends from the City of Ottawa to Kingston and makes the Rideau and Cataraqui navigation available for a distance of 126 $\frac{1}{4}$  miles. The total cost of this canal to 1905 was \$4,085,889.

The Lachine canal, although a part of this system, has already been described among the canals of the St. Lawrence system.

THE CHAMBLY CANAL. - 156.

The Chambly canal was designed to connect the navigation of the St. Lawrence with that of the Hudson river by way of the Richelieu river, Lake Champlain and the Champlain canal. In 1818 a company was incorporated by an act of Parliament of Lower Canada to construct this canal. It was empowered to build canals and otherwise to improve the navigation of the Richelieu river, but nothing was done by this company. In 1831 the construction of this canal was begun by the Government of Lower Canada under an act appropriating £60,000. Work continued until this amount and £6,000 additional was expended. In 1840 operations were resumed and in 1843 the canal was opened to navigation. The construction was found to be faulty and most unsatisfactory, and it became necessary, to a large extent, to reconstruct the canal in 1858.

The Richelieu river joins the St. Lawrence about 46 miles below Montreal and the Chambly canal is about 46 miles from its mouth. The canal lies on the west side of the river and extends for twelve miles,—from Chambly basin to St. John. The river between these points is practically a continuous rapid, the fall being about 74 feet in the twelve miles, and the canal furnished the only means of passing.

The St. Ours lock and dam are situated 32 miles below the canal proper and fourteen miles above the mouth of the river and are a part of this system of navigation. They were built between the years 1844 and 1848 at a cost of about \$121,538. Associated with this lock and dam there is also one-eighth of a mile of canal proper. The Richelieu river itself has been largely improved by dredging, but its depth has always been the limiting factor to traffic by this route.

The total cost of construction to 1905 was \$637,057.

#### THE TRENT CANAL. — 157.

The term "Trent Canal" is applied to a series of water stretches, which do not form a connected system of navigation, and which, in their present condition, are efficient for local use only. The route of the Trent canal runs through a chain of lakes and rivers, which would, if completed, form a continuous line of navigation between Lake Ontario at Trenton and Georgian Bay near Midland.

About 1820 the Imperial Government undertook the construction of this canal as a part of a system of canals for opening up the country; navigable stretches of from twenty-five to thirty miles were created by means of locks, dams, etc. The money for completing the entire distance from Trenton to Balsam lake was voted, but was used to subdue the McKensie rebellion. The work on this canal was then abandoned, but in 1880 it was started again and continued until about 1888. Several locks and dams and sections of canal were built during this period. Nothing further was done, however, until 1894, when work was again started, but it is not yet completed. The total outlay on this system to 1905 was \$4,957,654.

At Peterborough on this canal, there is one of the most notable locks in the world. It consists of two balanced tanks rising and falling vertically between masonry guide-towers. The two tanks are so balanced that, when a boat enters the lower one, the introduction of a comparatively small amount of water in the upper tank suffices to raise the lower one to the upper level, while the tank formerly at the upper level sinks to the lower position. The total lift of this lock is 65 feet, which is greater than the lift of any similar lock in the world. It will admit the passage of 800-ton barges and it cost \$500,000.

## SAINT PETER'S CANAL. - 158.

St. Peter's canal differs from the other Canadian canals in that it is not connected with the waterway from the Great Lakes to the sea. It connects the Bras d'Or lakes of Nova Scotia with the Atlantic ocean, by way of St. Peter's bay. The total cost of construction to 1905 was \$648,547.

Comparative Statement of Traffic on Canadian Canals for a Period of Years.

DATE.	WELLAND.		ST. LAWRENCE.		CHAMBLY.		OTTAWA.		RIDEAU.	
	Tons of freight.	Tolls.	Tons of freight.	Tolls.	Tons of freight.	Tolls.	Tons of freight.	Tolls.	Tons of freight.	Tolls.
1879.....	835,664	\$163,708	943,658	\$74,427	180,569	\$17,901	486,722	\$44,607	109,415	\$4,862
1880.....	819,934	147,366	1,072,556	88,891	202,097	20,341	644,549	58,890	101,298	5,278
1881.....	686,506	115,691	957,446	93,439	223,924	21,805	698,280	57,674	113,276	5,696
1882.....	790,643	140,178	911,050	76,958	263,711	25,191	790,400	63,180	108,425	5,845
1883.....	1,005,156	182,061	856,786	75,869	232,279	22,199	743,274	59,937	91,307	5,315
1884.....	837,811	151,679	727,014	64,072	199,146	18,899	673,760	54,712	76,399	4,039
1885.....	784,928	143,301	734,280	61,097	184,212	17,118	763,236	54,431	87,944	4,937
1886.....	980,135	186,417	913,640	62,243	193,940	18,123	745,335	57,805	90,950	5,149
1887.....	777,918	144,562	840,982	60,195	223,272	20,499	683,047	54,997	92,478	5,417
1888.....	878,800	166,056	781,590	53,587	241,753	22,283	693,249	51,344	112,248	5,887
1889.....	1,045,273	215,686	919,872	57,955	220,281	20,708	694,771	56,961	113,126	6,981
1890.....	959,502	188,580	839,304	79,924	225,044	20,187	645,041	47,149	100,667	5,910
1891.....	975,013	188,824	936,794	62,727	229,004	20,960	647,011	43,067	109,313	5,773
1892.....	955,554	185,803	966,755	69,067	270,708	22,049	681,521	35,284	104,234	4,957
1893.....	1,204,823	193,276	1,138,376	68,249	312,870	22,049	892,010	34,043	94,479	5,886
1894.....	1,008,821	159,694	846,778	63,005	277,608	21,150	851,220	31,959	88,753	5,679
1895.....	869,595	138,714	828,228	61,144	356,027	25,921	841,246	30,507	73,907	5,011
1896.....	1,279,687	194,969	1,113,690	70,004	344,935	24,151	842,970	34,032	77,276	5,781
1897.....	1,274,292	188,452	1,231,965	70,718	352,138	23,809	846,866	36,921	64,636	5,784
1898.....	1,088,598	168,598	1,439,134	90,855	271,336	19,326	846,866	36,921	69,905	5,784
1899.....	1,188,034	178,034	1,349,093	85,349	362,635	26,000	846,866	36,921	70,132	5,784
1900.....	769,700	104,117	1,369,096	96,907	346,561	24,206	846,866	36,921	66,576	5,784
1901.....	693,209	86,700	1,208,296	97,277	356,788	24,865	846,866	36,921	61,120	5,784
1902.....	963,307	98,601	1,083,133	65,061	378,442	22,713	846,866	36,921	50,579	5,784
1903.....	1,002,019	No tolls.....	1,081,206	No tolls.....	346,571	No tolls.....	436,473	No tolls.....	61,120	No tolls.....
1904.....	811,371	No tolls.....	1,427,316	No tolls.....	446,187	No tolls.....	335,993	No tolls.....	50,120	No tolls.....





A few years ago a monograph on the "Canals of Canada" was prepared by Mr. Thomas C. Keefer, which treats the whole subject of constructed canals so well and so concisely, that permission has been obtained from the author to insert the paper here, that portion relating to projected waterways, however, being omitted. Explanatory foot-notes have been inserted by Mr. S. J. Chapleau, of the Department of Railways and Canals, Ottawa, Canada.

#### CANALS OF CANADA

(Paper read before the Royal Society of Canada, 1893)

by

Thomas C. Keefer, C. M. G., F. R. S. C.

#### INTRODUCTION.

The Bridgewater canal, which inaugurated a system of inland navigation that gave to Britain above five thousand miles of artificial waterways before the railway era, and established the reputation of James Brindley as the Father of English Hydraulic Engineers, was authorized by the Parliament of Great Britain in the same year in which Wolfe scaled the heights of Abraham and made Canada a British possession.

The opening of the Liverpool and Manchester Railway in 1830 was followed by the opening of a Canadian railway in 1836, which connected the navigation of the St. Lawrence with that of Lake Champlain. In like manner (but at a much earlier date) canal construction in England was followed by canal agitation in her new possessions upon the St. Lawrence.

Silas Deane, a Connecticut man, who had been a member of the first Continental Congress, and was with Franklin in Paris (in 1776), brought the matter of a canal from the St. Lawrence to Lake Champlain, *via* Chambly, before Haldimand and his successor Lord Dorchester, Governors of Quebec, as early as 1775. He appears also to have advocated a canal making this connection above Montreal—a project since known as the Caughnawaga canal. Lord Dorchester expressed the opinion that such a canal "would be practicable and useful both in a commercial and political view." Adam Lymburner, in 1791, renewed the proposal, as noted, for an outlet for Vermont and northern New York. Ira Allen, in 1796, addressed the Duke of Portland "on behalf of the State of Vermont" upon the same subject. Some one in the Duke's office was apprehensive that such a canal might "tend to disseminate republican principles among His Majesty's Canadian subjects;" but it may be assumed that the needs of the St. Lawrence route, rather than fear of political consequences, relegated this canal scheme to a later period.

The first lock canals<sup>1</sup> in Canada were built upon the St. Lawrence around the upper and lower of the three rapids between Lake St. Francois and Lake St. Louis, at the Coteau and the Cascades. They were promoted by Haldimand, then Governor of Quebec, and were built by Royal Engineers between 1779 and 1783, both for the transport of military stores and for commercial purposes. The locks were of stone<sup>2</sup> less than forty feet long and only six

<sup>1</sup>There was a canal partly built without locks, previous to 1779 around Lachine—1701-18—a partial description follows. Through this the boats were to be hauled up against the current, and it was undertaken through the efforts of the Sulpician Fathers.

<sup>2</sup>In fair preservation to-day, much of the stone and mortar being intact.

feet wide, and with but thirty inches of water, which was as much as could be used in the then condition of the rapids elsewhere; and sufficient for the only boat, beside canoes, then in use, which was the bateau—a flat-bottomed, sharp-pointed skiff about five and one-half feet beam and thirty-five feet long—about the proportions of the Venetian gondola. These locks were enlarged<sup>3</sup> (1800-4) to one hundred and ten feet in length and twelve feet in width, so as to pass a “brigade” of six bateaux at one lockage. The depth of water was increased to four feet. This provision for flotilla is now our latest development at Sault Ste. Marie—a return to first principles, which, it is to be regretted, cannot be carried upon other canals with heavy traffic and a short navigable season. These enlarged locks displaced the bateaux by inviting the “Durham” boat, an American barge, which carried three hundred and fifty barrels of flour—about ten times<sup>4</sup> as much as the early bateaux. Before the construction of the Erie canal, northern New York, as well as Vermont, exported *via* the River St. Lawrence. Hundreds of thousands of barrels of flour and bushels of wheat were shipped from the St. Lawrence in the closing years of the last and the opening ones of this century.

The first lock between Lake Huron and Lake Superior was made by a Canadian company in the closing years of the last century. One of the northwest fur trading companies of Montreal cut a roadway forty-five feet wide across the portage on the north or Canadian side of the Sault Ste. Marie and opened “a canal upwards of three hundred feet in length, with a lock which raised the water nine feet.” This lock, thirty-eight feet long and eight feet and three-quarters wide, was built like a flume, the posts of which at the lower end were high enough to permit boats to pass under their cape. A windlass raised the lower gates, but the upper ones were “folding,” with sluices therein to fill the lock. A planked flume the width of the lock, three hundred feet long and six feet high, conducted the boats into this lock. A round log cribbing the whole length of the canal, twelve feet in width, forming a tow-path for the oxen used in dragging the boats up-stream. As the whole fall at the Sault is eighteen feet, and the lock only dealt with half of this, the canal or channel above must have had a surface inclination of three feet in a thousand. It was completed in 1798. In July, 1814, this post was pillaged and burned by Major Holmes at the head of one hundred and fifty Americans, when it is supposed that this lock (with the wooden banks of its canal) was “burned to the water’s edge.”

#### FRENCH REGIME.<sup>5</sup>

In the first year of the eighteenth century, Catalogne, military engineer of the King of France (who was probably the first engineer sent to Canada), commenced a channel from the St. Lawrence at Lachine to a marshy lake on a direct route to Montreal, from which lake it was connected with and followed the “Little River” to its outlet in front of the city. This, like the boat canal of 1793 at Sault Ste. Marie, was intended for a combined canal mill-race, but without any lock. This work was undertaken by Dollier de Casson, Superior of the Seminary of Saint Sulpice,—but his death in 1701

<sup>3</sup>Not the original locks.

<sup>4</sup>French measure.

<sup>5</sup>Quebec fell September 13, 1759.

arrested it. In 1717 it was resumed, but after an expenditure of twenty thousand francs it was abandoned on account of the cost of the necessary rock cut at Lachine. This was, in all probability, the first rock excavation for canal purposes upon the St. Lawrence.\* For the rock excavation in connection with the first locks built by the English more than half a century later, Cornish miners were procured.

#### PROVINCIAL EFFORTS.

*The Lachine Canal* was taken up by the Legislature of Lower Canada after the war of 1812, and money voted in 1815 therefor, but nothing was done. In 1819 a company was incorporated, which did not proceed. In 1821, Government commissioners were appointed and the work was completed in 1825. This first canal was twenty-eight feet wide on bottom, forty-eight feet wide at water-surface, and four and a half feet deep. The locks were seven in number, one hundred feet long, and twenty feet wide in chambers, and built of excellent masonry. The total rise from Montreal to Lachine is forty-five feet. The canal had been projected and its construction advocated by Adam Lymburner in 1791, but the reason why locks were first constructed higher up the St. Lawrence (at the Cascades and Coteau, 1783) was because Lachine is only seven miles from Montreal, and was the starting point of the brigades of bateaux, the loads for which could be carted from Montreal.

The first Lachine canal was doubtless built as part of a system, because a joint commission for Upper and Lower Canada had in 1818 reported in favor of a canal system for the St. Lawrence, with four feet depth of water, that being the depth of the Erie canal. Within a year after the opening of the Lachine, Col. By—the Royal Engineer then constructing the Rideau canal—recommended for the St. Lawrence longer and wider locks, with double the depth of water, and in 1832, Upper Canada voted for a minimum of nine feet water. Nevertheless, twenty years elapsed after the opening of the first Lachine canal before the last of the St. Lawrence canals was completed, and this was then on a scale as to dimensions of locks and depth of water more than double that of the old Lachine.

The next in order of construction, although not of position upon the main line of the St. Lawrence navigation, was:

*The Welland Canal.* A joint committee of both Houses of the Parliament of Upper Canada was appointed in 1816 to report upon inland navigation, and in 1821 a commission was named, which in 1823 reported in favor of constructing the Welland canal (which had been agitated before 1818 by the late Hon. W. H. Merritt) for the class of vessels then navigating the lakes. Instead, however, of being undertaken as a Government work, a joint stock company was formed in 1824 and ground was broken the same year. Their first approval was a boat canal combined with an inclined railway, instead of locks, and with a tunnel through the summit. This was abandoned the following year for an open canal with locks. It was opened in 1829 (with forty wooden locks, one hundred and ten feet long by twenty-two feet wide in the chambers, and eight feet depth of water) by the passage of a British and American schooner from Lake Ontario into Lake Erie by the route of the Welland, and of the Niagara river into which it flows,—above the falls of the latter. In 1833 this canal was extended upon the direct line of Lake Erie,

\*First under authentic record in North America.

but was fed from a higher level in consequence of slides in the summit cut, which took place in 1828. The Grand river, which was the feeder, was deficient in dry seasons; after the Union,<sup>7</sup> therefore, when the canal was purchased by the Government, it was determined (in 1843) to lower the whole summit level (which is more than half the length of the canal), so that Lake Erie could become the feeder. This undertaking proved to be the work of several decades, carried on, as it necessarily was, subject to the maintenance of the navigation, and the necessity of deepening the summit cut (from which the water could not safely be withdrawn) by dredging, and the towing of much of this dredged material half the length of the canal in order to dump it into Lake Erie. The dredging could only be made during the navigation season, and the deepening, elsewhere, only in winter. It was, therefore, not until 1881 that Lake Erie became the feeder. This canal was twenty-seven miles long with three hundred and forty-six feet of lockage, or fifteen feet more than the difference of level between Erie and Ontario; but since 1881 the lockage has been reduced by that much and is now the minimum.

Upon the union of Upper and Lower Canada in 1841 steps were taken by the Province of Canada to enlarge the Welland (the wooden locks of which were falling into decay) and the Lachine, and to complete the remainder of the St. Lawrence canals—only one of which—the Cornwall—had been commenced by Upper Canada before the Union. The forty wooden locks on the Welland were, by increasing lifts, replaced by twenty-seven stone ones, each one hundred and fifty feet long by twenty-six and one-quarter feet wide in chambers, with nine feet of water at the mitre sill, and the canal was completed upon this scale in 1846. The first enlargement of the Welland was contemporaneous with the completion of the St. Lawrence system, which had been commenced at Cornwall in 1834. The Lachine canal was a barge canal, used in connection with the military canals of the Ottawa and Rideau route, and the Welland a ship canal connecting Lakes Erie and Ontario. Between these there existed on the St. Lawrence no advance in heavy freight transportation over that of the bateau or Durham boat of 1804. Great improvement in passenger transportation had been made by the introduction of steamers on Lake St. Louis and Lake St. Francis (reaches of the St. Lawrence), and on the river above the Long Sault<sup>8</sup>; and by their connection by portage or plank roads on which stages were established; but all the heavy freight was sent by the Ottawa and Rideau route to Kingston.<sup>9</sup>

#### UNITED CANADA.

*The St. Lawrence Canals.* The Cornwall canal was commenced by Upper Canada in 1834, suspended by the rebellion of 1837, and not resumed until after the reunion, when it was completed in 1843. Its lock dimensions were a great advance upon the old Lachine or upon the new Welland, being two hundred feet long by fifty-five feet wide in the chambers, and the depth of water nine feet. These dimensions appear to have been adopted to pass the short side-wheel steamers required for quick turning in running the rapids. There was no enlargement of this canal previous to the confederation of the British North American Provinces in 1867, because no greater dimensions

<sup>7</sup>Upper and Lower Canada, 1841.

<sup>8</sup>Opposite Massena, N. Y.

<sup>9</sup>That is from Montreal to Ottawa via Ottawa river and the Carillon and Grenville canals, thence to Kingston via the Rideau canal system.

were established by the Province of Canada in 1841 for the remainder of the St. Lawrence canals. This canal was eleven and one-half miles long with seven locks, and a total lockage of forty-eight feet. The breadth on bottom of canal was one hundred feet and on water surface one hundred and fifty feet.

*Beauharnois Canal.* This canal, entirely in Lower Canada, and the only one upon the south side of the St. Lawrence, was not commenced until after 1841, when (while maintaining the Cornwall length of lock and depth of water) the Government of United Canada reduced the width ten feet for all remaining St. Lawrence canal locks. It was commenced in 1842 and completed in 1845. The length of this canal is eleven and one quarter miles, with nine locks two hundred by forty-five in the chambers, nine feet water on the sills, and eighty-two and one-half feet total lockage. It is not being enlarged because a new canal<sup>10</sup> several miles longer, but with fewer locks, is now being constructed (on the enlarged scale adopted after confederation) upon the opposite side of the St. Lawrence.

*The Lachine Canal.* The first enlargement of this old canal was in progress simultaneously with those above it, but it was not opened upon the new dimensions (similar to those of the Beauharnois) until 1848.

*The Williamsburg Canals.* The three smaller canals above the Cornwall, at "Farran's Point," "Rapide Plat" and "The Galops," known collectively as the Williamsburg canals (so called from their situation in a township of that name), were completed in 1847 upon the Beauharnois scale. These three canals, with a combined length of twelve miles and an aggregate lockage of thirty-one feet, are not necessary to the descending navigation, and are not used by the passenger steamers going up,—the rapids which they avoid being navigable in both directions by steamers; but for the upper one, "The Galops," a lock has been put in below the strongest current (about four thousand feet from the head), by which ascending boats may keep the river up to this lock, and thus avoid seven miles of canal. The section of the Galops rapids where the heaviest water is, has been deepened to seventeen feet to provide for the safe passage of descending lake vessels drawing fourteen feet while pitching through the swells of this rapid.

Thus, upon the completion of the first enlargement of the Lachine canal, in 1848, a boat nearly one hundred and forty feet long, twenty-six feet beam, and nine feet draught could for the first time pass from Montreal to Chicago. The notable feature of the St. Lawrence section of the Canadian canals is that although there are forty miles of canal and over two hundred feet of lockage, steamers of five hundred tons and over daily descend from Lake Ontario to Montreal, during the navigable season, without using lock or canal. Though the fall is, in some of the rapids, over forty feet per mile, all are navigable downwards by boats drawing six to eight feet, according to river level.

#### THE DOMINION OF CANADA.

As the Province of Canada, in 1841, commenced the improvement of the inland navigation by the enlargement of the Welland and Lachine, and the completion of the remaining St. Lawrence canals with uniformity only as to depth of canal between tide-water and the upper lakes, so, thirty years later (after confederation in 1867 with the maritime provinces, and the acquisition of the Northwest Territories from the Hudsons Bay Company), the Dominion of Canada took up the question of inland navigation.

<sup>10</sup>Soulanges canal.

A canal commission was appointed in November, 1870, which reported in February, 1871, advising a uniform scale of navigation for the St. Lawrence and Welland canals, with locks two hundred and seventy feet long by forty-five feet wide in the chambers, and with twelve feet depth of water upon the mitre sills. Before, however, any locks were constructed, the Dominion Parliament, in 1875, without dealing with lock dimensions, ordered the enlarged canals to be deepened so as to pass vessels drawing fourteen feet of water.

In arriving at lock dimensions and draught of water the commission of 1871 seem to have been governed by the then prevailing size of the majority of the vessels on the upper lakes, as well as by the then depth of water in the harbors. But, while the commissioners recommended twelve feet, they gave the depth of seventeen harbors, twelve of which had, or were capable of having fourteen feet and over, and they stated that this draught had then been reached through the St. Clair Flats, and made the significant comment that "as fast as the channel was deepened the draught of the vessels increased." These considerations doubtless influenced Parliament in increasing the depth. Moreover, while providing a lock for vessels of two hundred and fifty feet length, the commissioners noted the fact that, in 1871, at least two screw steamers then in commission on the lakes were two hundred and sixty-five feet long, and they referred to the lock at Sault Ste. Marie, which had been then fifteen years in use with a length of three hundred and fifty feet. They thought it "extremely unwise to embark in magnificent schemes with a view of introducing ocean vessels into the canals or lakes," and therefore leaned to moderate conditions as defined by existing traffic instead of anticipating any such expansion as had already enforced two enlargements of our canals.

The final enlargement upon a uniform scale for all, except the single lock at Lake Superior, is now (1893) in progress but is only completed as regards the Welland canal, which was opened with its new locks and twelve feet of water in 1883, and with fourteen feet in 1887. The Lachine enlargement has been completed many years for twelve feet depth, but with its structures founded for fourteen feet; this is, however, useless for navigation purposes until the completion of the remainder of the St. Lawrence canals (all of which are now under contract to be completed in 1895),<sup>11</sup> when steamers about two hundred and sixty feet length and forty-four and one-half feet beam can pass between Montreal and Lake Superior loaded down to fourteen feet in the canals.

*Sault Ste. Marie.* The canal commission of 1871 proposed to extend their uniform scale of lock dimensions (270 by 45 by 12) to Lake Superior, although there was then in operation upon the American side at the Sault two locks 350 by 70 by 12. It is fortunate that the construction of the canal at this point has been delayed until the present decade.

The Canadian canal now under construction at the Sault will have a single lock of eighteen feet lift, with a length of chamber of nine hundred feet, a width of sixty feet, and a depth of nineteen feet at "lowest recorded water level," which is said to be equivalent to the twenty-one feet at "mean low water," fixed for the new lock (Poe) in progress on the Michigan side. The length of nine hundred feet is "designed to pass three vessels at

<sup>11</sup>These were completed in fall of 1899.

one lockage; one of the upper type, four hundred and twenty feet long, and two of the Welland Canal type, two hundred and fifty-five feet long." This official explanation of the length emphasizes the painful fact that the Welland type is not a lake one. No explanation of the width is given. Sixty feet is too wide for one vessel and not wide enough for two. The new American lock will be eight hundred feet long and one hundred feet wide, a width sufficient for two or three craft abreast.<sup>13</sup>

Although Canada is only now constructing a canal to reach Lake Superior, this completion of the Canadian system has always been kept in view. In 1846 and again in 1852, before the canal was commenced upon the Michigan side, the Province of Canada made surveys and estimates for a canal at the Sault, and it was included in the scheme of the canal commission about twenty-five years later. At neither of these dates was there any Canadian commerce upon Lake Superior, and this is the strongest evidence that the Canadian canals looked chiefly to the northwestern states of the Union for their support. This is also confirmed by the history of the Welland canal, which was first built by a joint stock company having its principal shareholders in New York and England, as also by the fact that the canal commission of 1870 were instructed to advise "the best means to attract a large and increasing share of the trade of the northwestern portion of North America through Canadian waters, such as will enable Canada to compete successfully for the transit trade of the great western country."

#### SUBMERGED CANALS BELOW MONTREAL.

This historical sketch of the main system canal, Montreal to Lake Superior, would be incomplete without a reference to the great work of deepening the channel of the St. Lawrence from eleven to twenty-seven and one-half feet between Montreal and Quebec. Commenced by the Government of Canada in 1844, it was abandoned in 1847 and taken up again in 1850 by the harbor commissioners of Montreal, and carried on at the expense of the trade of the port. The original low water depth of eleven feet in 1850 was increased in 1851 to fourteen feet; in 1852 to sixteen and one-half; in 1857 to eighteen feet; in 1865 to twenty feet. Resumed in 1874 it was in 1878 increased to twenty-two feet; in 1882 to twenty-five feet and in 1888 to twenty-seven and one-half feet. The work was then taken over and its cost assumed by the Dominion Government, to the great relief of the Harbor Trust. The total cost is about four millions of dollars, of which over half a million is for dredging plant.

The total length of channel deepened is about fifty miles, of which about eighteen miles are in Lake St. Peter. There is a continuous cut of about sixteen miles in the bottom of the lake, three hundred feet wide, and ranging from fifteen to seventeen feet in depth.

#### SUMMARY OF THE ST. LAWRENCE ROUTE.

From Montreal to the head of the St. Lawrence canals (which is about eight miles below Ogdensburg) the distance is about one hundred and eleven miles, of which forty-three miles are canal, forty-eight miles lake and twenty miles river. Commencing at Montreal the distribution and the names of the St. Lawrence canals are as follows:

<sup>13</sup>Interesting here to note that the new contemplated lock on the American side is thirteen hundred and fifty feet long by seventy-five feet wide, and twenty-five feet on sills, approximately.

Canals.	Length.	Locks.	Lockage.	Distance between.	
	<i>Miles.</i>		<i>Feet.</i>		<i>Miles.</i>
Lachine.....	8½	5	45	Thence to Beauharnois canal (Lake St. Louis).....	15½
Beauharnois.....	11½	9	82½	Thence to Cornwall (Lake St. Francis).....	32½
Cornwall.....	11½	6	43	Thence to Farran's Point (river).....	5
Farran's Point.....	½	1	4	Thence to Rapide Plat (river).....	10½
Rapide Plat.....	4	2	11½	Thence to Galops (river).....	4½
Galops.....	7½	3	15½		
	43	26	206½		68

The Soulanges canal, now being substituted for the Beauharnois, will have the same lockage (with five locks instead of nine),<sup>12</sup> but nearly three miles greater length, the lake distance being decreased in this extent.

From the head of the St. Lawrence canals to the foot of the Welland canal the distance is two hundred and twenty-six miles, of which one hundred and sixty are in Lake Ontario. The Welland, as now enlarged, is twenty-six and one-half miles long, and has twenty-five locks, with a total lockage of three hundred and twenty-six and three-quarter feet, all of which is embraced in the first ten miles from Lake Ontario.

From the head of the Welland canal to the foot of the Canadian canal at Sault Ste. Marie, the distance is about six hundred miles. The length of the Sault canal upon the Canadian side is about three thousand, five hundred feet, with one lock of eighteen feet lift, but the under excavation, for deepening the approaches to nineteen feet at extreme low water, will be several times the length of the visible canal. The total length of canal and approaches is eighteen thousand, one hundred feet. From the Sault to Port Arthur is two hundred and sixty-six miles and Duluth three hundred and ninety miles. The completion of this canal at the Sault will extend Canadian inland navigation, from the ocean vessel at Montreal, over fourteen hundred miles of fresh water, with less than seventy-five miles of canal, and with about five hundred and fifty-one feet of lockage to reach Lake Superior, the surface of which is six hundred feet above tide.

The locks of the Canadian canals, with the exception of those now under construction at the Sault and the Soulanges canal, have moderate lifts, and are repetitions of the simple and economical features of the original Welland canal. The lock floors are of wood, and their upper gates the same height as their lower one—the filling and emptying being through valves in these gates.

The Soulanges canal and that at the Sault Ste. Marie are new departures. The chambers are filled and emptied by culverts in the side walls or floor which, in the first, is of masonry, and the upper gates rest upon curved breast walls. Electric motors, driven by a water-power current, will work gates, automatic sluices at weirs, as well as swing bridges; which last are without usual central pivot piers—thus opening the full width of the channel. Portland cement concrete will generally be substituted for the masonry in the Soulanges works.

<sup>12</sup>Four lift-locks, one guard-lock.



## THE LATERAL CANALS.

*The Chambly Canal.* The Richelieu river, by which Lake Champlain discharges its waters, is, by position and navigable qualities, the most important tributary of the St. Lawrence, with the single exception of the Ottawa. Lake Champlain is over ninety feet above tide, and the summit between it and the Hudson river is only sixty feet more. This lake and the Hudson lie in the same north and south direction upon almost an air line between Montreal and New York. The navigable waters of Lake Champlain are extended northward by the Richelieu river to St. Johns, which is only twenty-five miles from the St. Lawrence at the point above Montreal where a connecting canal between the two rivers, known as the Caughnawaga canal, has long been proposed.

At St. Johns the Chambly canal extends twelve miles northward (and down-stream) with nine locks, each one hundred and eighteen feet long, twenty-three feet wide, with seven feet water, and a total of seventy-four feet lockage. This canal was put under contract in 1831, but was not completed until after the Union of 1841, and has not since been enlarged. Between the foot of this canal and the mouth of the Richelieu at Sorel (a distance of forty-six miles) the river is made navigable by a dam and lock at St. Ours, thirty-two miles from Chambly and fourteen from Sorel. This lock of five and one-half feet lift was constructed, 1844-9, upon the enlarged scale of two hundred feet by forty-five feet in the chamber, with seven feet water. The cost of this navigation, with its ten locks and seventy-nine feet of lockage, has been about \$750,000.

*The Ottawa and Rideau Route.* The St. Lawrence route was, by the Royal Engineers, considered to be too near the frontier for a military one. The influence of the Imperial Government was exerted in favor of an interior route between Montreal and Kingston, via the Ottawa and Rideau rivers. The Provincial Government of Upper Canada was offered, in 1824, financial assistance if it would undertake the Rideau canal (which is within the Provincial territory), but declined upon the ground that the St. Lawrence would best serve the commercial interests of the country. The Home Government, in 1826, decided to carry out this inland communication, which had been commenced upon the Ottawa at Grenville, midway between Montreal and the Rideau, in 1819. Seven locks were constructed, one hundred and six and one-half feet by nineteen and one-half feet in the chamber, with six feet water, but the remaining ones upon the Ottawa were, in 1828, enlarged to one hundred and twenty-nine by thirty-two, with the same depth of water.

The Rideau canal was commenced in 1826 and opened in 1832, but not completed until 1834. The locks were increased in length and width over the enlarged Ottawa ones, but the depth of the water was decreased. They are now one hundred and thirty-four by thirty-three, with five feet water, and have never been enlarged. The route at Ste. Anne,<sup>14</sup> fifteen miles above Lachine, where the Ottawa joins the St. Lawrence, were not embraced in the scheme of the military canals. There are only three feet here, and they were navigable at high water by the early boats. There was also a lock to pass them upon the Vaudreuil or Isle Perrot side, owned by a forwarding company. As the Lachine canal locks<sup>15</sup> are only one hundred by twenty-four

<sup>14</sup>Where the middle branch of the Ottawa empties into the St. Lawrence.

<sup>15</sup>At this time.

by four and one-half, compared with one hundred and thirty-four by thirty-three by five for those of the Rideau, it is possible that the original intention, before the whole scheme was abandoned, was to reach the St. Lawrence below Montreal by that branch of the Ottawa which passes behind the island of Montreal,<sup>16</sup> in which case the Ste. Anne's rapids would be avoided.<sup>17</sup> The Grenville locks were commenced before the (original) Lachine, which probably accounts for their greater length. The first lock at Ste. Anne was built after the Union and completed in 1843. It was one hundred and ninety by forty-five in the chamber, with six to seven feet of water. A new one two hundred by forty-five by nine feet of water has been placed alongside. These latter dimensions are those adopted for the Ottawa and Lake Champlain route.

Measured from Lachine (which is common to both) the distance to Kingston by the Ottawa and Rideau route is two hundred and eighteen miles, as compared with one hundred and seventy miles by the St. Lawrence. The number of locks is fifty-five, and the total lockage five hundred and nine feet (three hundred and forty-five feet rise and one hundred and sixty-four fall) against twenty-six locks and two hundred and six and one-half feet lockage (all rising) by the St. Lawrence. Of the one hundred and eleven miles of this route between Lachine and Ottawa City, nearly seven miles are canal, and of the one hundred and twenty-six miles of the Rideau route between Ottawa and Kingston about sixteen and one-half are canal. The lesser length of canal upon the longer and higher route to Lake Ontario is due to the fact that the St. Lawrence can not be dammed.<sup>18</sup>

*The Military Canals*, between Carillon and Grenville, were three in number, and overcame a fall in the Ottawa river of nearly sixty feet. Carillon was the lowest, Grenville the highest, and the intermediate one (since abolished) was known as the "Chute-a-Blondeau." The Carillon canal climbed twenty-one and one-half feet over a rocky bluff by two combined locks, the side walls of which were formed by the rock cutting, and then descended thirteen feet by one lock to the river, and was supplied by a feeder from the North river. In the recent enlargement a dam at Carillon raises the river nine feet, drowning out the rapids and substituting six and one-half miles of new canals and seven locks for seven miles of old canal with eleven locks. There are now only two canals—the Carillon, three-quarters of a mile long, with two locks and thirteen feet lockage, and the Grenville, five and three-quarter miles long, with five locks and forty-three and three-quarter feet lockage, separated by a navigable reach of river five and one-half miles. These two canals are now enlarged to the scale fixed for the Ottawa and Lake Champlain route, the locks two hundred by forty-five by nine feet water; but are useless for this route until the Chambly canal and that at St. Ours are enlarged and deepened—works which will doubtless be delayed until there is an enlargement of the New York State canal between Lake Champlain and the Hudson river.

<sup>16</sup>Ottawa empties into St. Lawrence in three branches—at Cascades and at St. Anne above Montreal, and at Terrebonne below.

<sup>17</sup>This is misleading to one unaccustomed to the locality, as the drop from Lake Two Mountains to the St. Lawrence below Montreal remains the same whether the route goes by Lachine or the Recollet northwest of the city, approximately fifty-four feet.

<sup>18</sup>The Rideau (not Ottawa) could be and was.

The total new lockage between Lachine and the Rideau at Ottawa is sixty-two and three-quarter feet (of which three feet is at Ste. Anne), and is the minimum possible between these points.

*The Rideau Canal.* The total lockage on the one hundred and twenty-six miles of this route between the Ottawa river (at Ottawa) and Kingston, upon Lake Ontario, is four hundred and forty-six and one-quarter feet. From the Ottawa river it ascends two hundred and eighty-two and one-quarter feet by thirty-four locks, in a distance of eighty-seven and one-half miles to the summit level of the Rideau lakes, and then descends one hundred and sixty-four feet by thirteen locks in a distance of thirty-eight and three-quarter miles to Lake Ontario. There are twenty-four stone dams, two of which are thirty-three and sixty-eight feet high, respectively.

These military canals were handed over to Canada by the Imperial Government in 1853.

Considerable expenditure has been made upon the upper Ottawa at two points, and also upon the Back lake system near Peterboro', as well as upon the River Trent (the outlet of these lakes into the Bay of Quinte), which bay is the head of the St. Lawrence river navigation.

*Trent Navigation.* This Trent route, like that of the Ottawa valley, had been agitated, locally, for shortening the water route from the sea into Lakes Huron, Michigan and Superior. The total lockage upon this route to Lake Huron would exceed eight hundred and fifty feet, fully five hundred feet more than on the Welland route. About three hundred and seventy feet of this lockage (more than all upon the Welland canal) would be between Rice lake and Lake Ontario, and the water route between these lakes is about six times longer than the land route. Everything, therefore, but the timber (for which canals would only be an obstruction) would shun the water route, even if improved, on account of the length and the lockage. The inland navigation of the Trent, therefore, is not likely to "come to the front" in the near future. The Ottawa river route, among other projected canals, was referred by the Government in 1870 to the canal commission, but the Trent route was then ignored, and has since been taken up as a local work. The Trent scale of navigation is that of the Rideau canal, and the work done there recently has been confined to connecting this extensive land system by locks and dams, but there are cut-stone locks built over fifty years ago, upon the Trent river, the gates of which have never been hung. The route is too shallow, crooked and elevated to compete with that of the Welland. Over one million of dollars has been expended here, nearly one-third of which was before confederation.<sup>19</sup> This isolated navigation upon the northern slope of Lake Ontario has no connection with that lake or with Lake Huron.<sup>20</sup>

Upon the Ottawa river, above Ottawa, nearly the same amount has been expended upon the same principle of connecting isolated navigable stretches not connected with any outlet east or west. But in the Ottawa case the works have been abandoned, either before completion or since. The only completed, though unused one, was so leisurely prosecuted that the railway ran past it and rendered it unnecessary. The locks that are built are of wood, two hundred by forty-five by five feet of water, and are therefore no contribution to a future ship canal from Montreal to Lake Huron.

<sup>19</sup>Confederation of all the Canadian provinces, 1867.

<sup>20</sup>Work still in progress.

*St. Peter's Canal.* This is a tide level canal about half a mile in length connecting the Bras d'Or lake, a salt water estuary in Cape Breton, Nova Scotia, with St. Peter's Bay on the Atlantic. The first survey was made by one of Telford's engineers, in 1821, but work was not commenced until 1854. It was suspended in 1859, when the provincial engineer recommended a marine railway instead of the tidal lock. It was, however, resumed in 1864 and completed after confederation, with a lock one hundred and twenty-two by twenty-six with thirteen feet of water upon the sill. A new lock two hundred by forty-eight has replaced the old and the canal has been deepened to nineteen feet. The extreme rise and fall of the tide in St. Peter's Bay is nine feet—the range in the Bras d'Or lake being about one-third of that outside. The tidal lock has four pairs of gates and the whole expenditure has been \$845,000.

*The Shubenacadie Canal.* One of the earliest canals undertaken after the opening of the Lachine, was the Shubenacadie canal in Nova Scotia, projected to connect Halifax harbor with the basin of Minas. Costly masonry was erected, the sum of \$80,000 was expended, and the work neatly completed, but it proved a disastrous failure. There was insufficiency of water for lockage, and the tides in the Shubenacadie river are the highest anywhere—said to range seventy-five feet.<sup>21</sup>

Two short canals without locks connect Burlington Bay at the head, and Bay of Quinte at the foot, of Lake Ontario, with that lake.

*The Burlington Canal.* The Burlington canal is a short cut through the sand beach at the head of Lake Ontario and gives access to the port of Hamilton, Ontario. It has cost \$433,000.

*The Murray Canal.* The other is known as the Murray canal, projected in the last century when a land grant was set apart for it. It has only been recently opened with eleven feet of water at a cost of \$2,216,000 for a length of five miles from end to end of entrance piers.

*The Desjardins Canal.* A private company before our railway era opened a canal from Burlington Bay to Dundas at a cost of about \$100,000, by which lake schooners could ascend to that town. It was between three and four miles long and was called the Desjardins canal, but is now remembered only as the scene of a frightful railway accident in 1837.

*Grand River Navigation Company.* Another company, by means of dams and locks (and Indian money chiefly) extended a boat navigation in connection with the Welland canal, sixty miles up the Grand river—after that river was dammed in order to use it as a feeder to the Welland—at a cost of \$200,000. This also has been superseded by the railways.

The only new canal undertaken by the Dominion was for the improvement of Rainy river, an affluent of the Lake of the Woods by a lock and dam at Fort Francis. This was an attempt to utilize the natural water stretches in order to reach the Northwest at a time when the country had not as yet grown to sufficient confidence in its own resources and ability to carry out the Canadian Pacific Railway; and it was abandoned therefore as soon as that work was undertaken.

<sup>21</sup>Certainly over sixty-four feet.



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**DATA CONCERNING**  
**Canals in the United States and Canada**

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BOATS.		COST.		TRAFFIC.			
Capacity in tons.	How operated.	Cost of construction.	Expenditures for maintenance and repairs.	MAXIMUM.		MINIMUM.	
				Date.	Amount in tons.	Date.	Amount in tons.
30 75	Animal power.	\$7,143,789 00	.....				
240	Animal & steam- power.	31,834,041 00	.....	1880	4,608,651	1837	1667
240	Animal & steam- power.	.....	.....				
30 75	Animal power.	921,011 00	.....				
	Animal power.	.....	.....				
190	Animal & steam- power.	.....	.....	1890	1,520,757	1842	1230,
30 75	Animal power.	91,944 00	.....				
140	Animal power.	.....	.....				
30 75	Animal power.	565,437 00	.....				
240	Animal & steam- power.	2,511,992 00	.....				
240	Animal & steam- power.	.....	.....	1860	1,080,076	1900	131,
	Steam- power.	79,346 00	.....				
75	Animal & steam- power.	.....	.....				
75	Animal & steam- power.	14,864 00	.....				
30 75	Animal power.	.....	.....				
240	Animal & steam- power.	.....	.....	1869	533,516	1837	120,
75	Animal power.	.....	.....				
75	Animal power.	3,157,296 00	.....	1889	143,561	1851	25,
	Steam- power.	.....	.....				



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**PART FIVE**

**GREAT CANALS OF THE WORLD**

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1477

Parts of a monograph, entitled *Great Canals of the World*, published by the United States Department of Commerce and Labor, Bureau of Statistics, reprinted here by permission of Mr. O. P. Austin, Chief of Bureau.



## GREAT CANALS OF THE WORLD.

### THE SUEZ CANAL.

The Suez Canal is usually considered the most important example of ship canals, though the number of vessels passing through it annually does not equal that passing through the canals connecting Lake Superior with the chain of Great Lakes at the south. In length, however, it exceeds any of the other great ship canals, its total length being 90 miles, of which about two-thirds is through shallow lakes. The material excavated was usually sand, though in some cases strata of solid rock from 2 to 3 feet in thickness were encountered. The total excavation was about 80,000,000 cubic yards under the original plan, which gave a depth of 25 feet. In 1895 the canal was so enlarged as to give a depth of 31 feet, a width at the bottom of 108 feet and at the surface of 420 feet. The original cost was \$95,000,000, and for the canal in its present form slightly in excess of \$100,000,000. The number of vessels passing through the canal in 1870 was 486, with a gross tonnage of 654,915 tons; in 1875, 1,494 vessels, gross tonnage 2,940,708 tons; in 1880, 2,026 vessels, gross tonnage 4,344,519 tons; in 1890, 3,389 vessels, gross tonnage 9,740,129 tons; in 1895, 3,434 vessels, gross tonnage 11,833,637 tons; in 1900, 3,441 vessels, with a gross tonnage of 13,699,237 tons, and in 1903, 3,761 vessels, with a gross tonnage of 16,615,309 tons. The revenue of the canal is apparently large in proportion to its cost, the latest report of the company for 1903 giving the net profits for that year at 65,579,347 francs, and the total amount distributed among the shareholders 64,565,634 francs, or over 12 per cent of the estimated cost of \$100,000,000. The following statement regarding the condition of the capital account is from the Statesman's Year Book of 1901:

The state of the capital account as regards bonds in circulation and redeemed was as follows on December 31, 1899:

ITEMS.	IN CIRCULATION.		REDEEMED.		Total value of issue.
	Number.	Value at issue price.	Number.	Value at issue price.	
Capital, 400,000 shares, at 500 francs	389,305	<i>Francs.</i> 194,652,500	10,695	<i>Francs.</i> 5,347,500	<i>Francs.</i> 200,000,000
Consolidation of unpaid coupons, 400,000 bonds, at 85 francs.....	393,382	33,437,470	6,618	562,530	34,000,000
Loan (1867-68), 333,333 obligations, at 300 francs.....	218,108	65,432,400	115,225	34,567,500	99,999,900
Loan (1871), 120,000 30-year bonds, at 100 francs.....	16,780	1,678,000	103,220	10,322,000	12,000,000
Loan (1880), 73,026 3 per cent obligations, various prices.....	68,498	25,325,821	4,528	1,674,141	26,999,962
Loan (1887), 220,000 3 per cent obligations, various prices.....	217,708	90,151,859	2,292	949,106	91,100,965
Total.....					464,100,827
Revenue applied to improvement of canal.....					151,174,307
Redemption and insurance funds.....					17,764,598
Grand total.....					633,039,732

There were, besides, 100,000 founders' shares, with right to participate in surplus profit under certain conditions. In 1903 the net profits amounted to 65,579,347 francs, and the total amount distributed among the shareholders was 64,565,634 francs.

The canal is without locks, being at the sea level the entire distance. The length of time occupied in passing through the canal averages about eighteen hours. By the use of electric lights throughout the entire length of the canal passages are made at night with nearly equal facility to that of the day. The tolls charged are 8.50 francs per ton net register, "Danube measurement," which amounts to about \$2 per ton United States net measurement. Steam vessels passing through the canal are propelled by their own power.

#### THE CRONSTADT AND ST. PETERSBURG CANAL.

The canal connecting the Bay of Cronstadt with St. Petersburg is described as a work of great strategic and commercial importance to Russia. The canal and sailing course in the Bay of Cronstadt are about 16 miles long, the canal proper being about 6 miles and the bay channel about 10 miles, and they together extend from Cronstadt, on the Gulf of Finland, to St. Petersburg. The canal was opened in 1890 with a navigable depth of  $20\frac{1}{2}$  feet, the original depth having been about 9 feet; the width ranges from 220 to 350 feet. The total cost is estimated at about \$10,000,000.

#### THE CORINTH CANAL.

The next of the great ship canals connecting bodies of salt water in, the order of date of construction is the Corinth Canal, which connects the Gulf of Corinth with the Gulf of Aegina. The canal reduces the distance from Adriatic ports about 175 miles and from Mediterranean ports about 100 miles. Its length is about 4 miles, a part of which was cut through granitic soft rock and the remainder through soil. There are no locks, as is also the case in both the Suez and Cronstadt canals, already described. The width of the canal is 72 feet at bottom and the depth  $26\frac{1}{4}$  feet. The work was begun in 1884 and completed in 1893 at a cost of about \$5,000,000. The average tolls are 18 cents per ton and 20 cents per passenger.

#### THE MANCHESTER SHIP CANAL.

The Manchester Ship Canal, which connects Manchester, England, with the Mersey River, Liverpool, and the Atlantic Ocean, was opened for traffic January 1, 1894. The length of the canal is  $35\frac{1}{2}$  miles, the total rise from the water level to Manchester being 60 feet, which is divided between four sets of locks, giving an average to each of 15 feet. The minimum width is 120 feet at the bottom and averages 175 feet at the water level, though in places the width is extended to 230 feet. The minimum depth is 26 feet, and the time required for navigating the canal from five to eight hours. The total amount of excavation in the canal and docks was about 45,000,000 cubic yards, of which about one-fourth was sandstone rock. The lock gates are operated by hydraulic power; railways and bridges crossing the route of the canal have been raised to give a height of 75 feet to vessels traversing the canal, and an ordinary canal whose route it crosses is carried across

by a springing aqueduct composed of an iron caisson resting upon a pivot pier. The total cost of the canal is given at \$75,000,000. The revenue in 1902, according to the Statesman's Yearbook, was £358,491, and the working expenses, £217,537. For the year ending June 30, 1903, the canal yielded £55,105 toward paying the £225,000 of interest which the city of Manchester has to pay on the capital invested in the enterprise.

#### THE KAISER WILHELM CANAL.

Two canals connect the Baltic and North seas through Germany, the first, known as the Kaiser Wilhelm Canal, having been completed in 1895 and constructed largely for military and naval purposes, but proving also of great value to general mercantile traffic. Work upon the Kaiser Wilhelm Canal was begun in 1887, and completed, as above indicated, in 1895. The length of the canal is 61 miles, the terminus in the Baltic Sea being at the harbor of Kiel. The depth is 29½ feet, the width at the bottom 72 feet, and the minimum width at the surface 190 feet. The route lies chiefly through marshes and shallow lakes and along river valleys. The total excavation amounted to about 100,000,000 cubic yards, and the cost to about \$40,000,000. The number of vessels passing through the canal in 1903-4 was 32,038, with a tonnage of 4,990,287, and the dues collected amounted to 2,414,499 marks.

#### THE ELBE AND TRAVE CANAL.

A smaller canal, with a length of about 41 miles and a depth of about 10 feet, was opened in 1900, known as the Elbe and Trave Canal, and is described by the International Yearbook, 1900, as follows:

"The Elbe and Trave Canal, in Germany, was opened by the Emperor of Germany on June 16, 1900. It has been under construction for five years, and has cost about \$5,831,000, of which Prussia contributed \$1,785,000 and the old Hanse town of Lubeck \$4,046,000. The length of the new canal is about 41 miles, and is the second to join the North Sea and the Baltic, following the Kaiser Wilhelm Canal (or Kiel Canal), built about five years ago at a cost of \$37,128,000. The breadth of the new canal is 72 feet; breadth of the locks, 46 feet; length of locks, 261 feet; depth of locks, 8 feet 2 inches. It is crossed by 29 bridges, erected at a cost of \$1,000,000. There are seven locks, five being between Lubeck and the Mollner See (the summit point of the canal) and two between Mollner See and Fauenberg-on-the-Elbe. At this point it may be noted that the Germans began experiments during 1900 with electric towing on the Finow Canal between Berlin and Stettin. A track of 1-meter gauge was laid along the bank of the canal, having one 9-pound and one 18-pound rail laid partly on cross-ties and partly on concrete blocks. The larger rail serves for the return current, and has bolted to it a rack which gears with a spur wheel on the locomotive. The locomotive is 6 feet 10 inches by 4 feet 10 inches, mounted on four wheels, with a wheel base of 3 feet 6 inches, and weighing 2 tons. It is fitted with a 12-horsepower motor, current for which is furnished by a 9-kilowatt dynamo, driven by a 15-horsepower engine. The current is 500 volts, and is transmitted by a wire carried on wooden poles 23 feet high and about 120 feet apart. The boats are about 132 feet long and 15 feet 6 inches beam, and carry from 150 to 175 tons on a draft of 4 feet 9 inches.

During 1900 the Stettin-Swinemund Canal, with a length of 35 miles, has been dredged throughout, and is now open to steamers drawing 22 feet of water. Swinemund is on the Baltic Sea. Among the various projects for European canals may be mentioned one connecting the Danube a little below Vienna, Austria, with the Adriatic Sea at Trieste, a distance of about 319 miles. Herr Wagenfahrer, of Vienna, is said to have the concession for this canal, the construction of which will cost some \$120,000,000. Late in 1900 a canal from Liege to Antwerp, in Belgium, was being seriously discussed, in order to connect the prosperous city of Liege with the sea, and make it, like the city of Manchester, England, a seaport. The original promoter of the scheme was Mr. Joseph Redonti, who is now dead. Mr. Redonti's plans have recently been put in practical shape by Louis Hubin and Gaston Delville, who propose a canal 84 miles long, 200 feet wide, and 23 feet deep from Antwerp to Liege, with locks at Liege, Hasselt, Herenthals, and Antwerp. The difference in level to be overcome by locks would be 175 feet, and it is thought that thirteen single locks and one double lock would be sufficient. The total estimated cost of the work is \$25,200,000."

#### CANALS PROJECTED IN PRUSSIA.

According to a recent report of United States Consul-General Guenther, of Frankfort, Germany, the committee on canals of the Prussian Diet has reported, with a favorable recommendation, a bill providing for the following construction:

1. A navigable canal between the rivers Rhine and Weser, with a connection to Hanover, and the canalization of the River Lippe:

(a) A navigable canal from the Rhine in the vicinity of Ruhrort, or from a more northern point, to the Dortmund-Ems Canal or the vicinity of Herne (Rhine-Herne Canal) inclusive of a branch canal from Datteln to Hamm; estimated cost, 74,500,000 marks (\$17,731,000).

(b) Several additional works on the Dortmund-Ems Canal between Dortmund and Bevergern; estimated cost, 6,150,000 marks (\$1,463,700).

(c) A navigable canal from the Dortmund-Ems Canal in the vicinity of Bevergern to the River Weser, connecting with Hanover; branch canals to Osnabrück, Minden, and Linden, construction of reservoirs in the upper parts of the River Weser and some regulation works of the Weser below Hameln; estimated cost, 120,500,000 marks (\$28,679,000).

(d) Canalization of the River Lippe or construction of branch canals of the Lippe from Weser to the Dortmund-Ems Canal, near Datteln, and from Hamm to Lippstadt; estimated cost, 44,600,000 marks (\$10,614,800).

(e) Improvement of the cultivation of the soil in connection with the works under items a to d, and the completed Dortmund-Ems Canal; estimated cost, 5,000,000 marks (\$1,190,000).

The total estimated cost of the work, items a to e, is placed at 250,750,000 marks (\$59,678,500).

2. The construction of a deep waterway between Berlin and Stettin; estimated cost, 43,000,000 marks (\$10,234,000).

3. The improvement of the waterway between the rivers Oder and Weichsel, also of the river Warthe from the mouth of the river Netze to the city of Posen; estimated cost, 21,175,000 marks (\$5,039,650).

4. The canalization of the river Oder from the mouth of the river Glatzer Neisse to the city of Breslau, experimental works on the line between Breslau and Fürstenberg on the Oder, construction of one or of several reservoirs; estimated cost, 19,650,000 marks (\$4,676,700).

The entire cost of the projects named is placed at 334,575,000 marks (\$79,628,850).

The construction of these works is to be commenced only if, before July 1, 1906, the provinces and municipalities or other political divisions have obligated themselves to pay their share of the cost, the interest thereon, and the deficit which may not be met by tolls. The shares of the cost of construction, and interest thereon, is fixed as follows: Rhine-Herne Canal, 24,300,000 marks (\$5,783,400); interest 3 per cent. Bevergern-Hanover Canal, 37,350,000 marks (\$8,889,300); interest 1 per cent. the first five years, 2 per cent the second five years, and 3 per cent from and after the eleventh year. Branch canals of the Lippe, 14,870,000 marks (\$3,539,060); interest, 3 per cent. Deep waterway Berlin-Stettin, 6,300,000 marks (\$1,499,400); interest same as with the Bevergern-Hanover Canal. Canalization of the river Oder 5,100,000 marks (\$1,213,800); interest same as with the Bevergern-Hanover Canal.

## INTERIOR WATERWAYS OF NORTHWEST EUROPE.

[Report by Consul Henry C. Morris in "Highways of Commerce," issued by Bureau of Foreign Commerce of the State Department, 1899.]

### FRANCE.

France is certainly the country where the Government has intervened most liberally in favor of interior navigation. The works executed upon navigable waterways since 1880 have cost the sum of \$87,000,000, and the relinquishment of the tolls represents also an annual sacrifice of several millions. It is interesting to note that the French Government has not done anything except to transform and improve the existing waterways. Of the 7,660 miles of navigable waterways which France possesses at present, there are scarcely 70 miles of canals recently constructed. Among them, however, we must mention the canal from the Oise to the Aisne, which greatly facilitates the relations between eastern France and Alsace-Lorraine, on the one hand, and northern France and Dunkirk on the other. The commercial importance of the various navigable ways is far from equal; indeed, 3,500 miles of the so-called principal water courses absorb more than 90 per cent of the total mileage traffic.

### CANALIZATION OF THE SEINE.

The most considerable work of all this period has been the canalization of the lower Seine from Paris to Rouen, which has cost in round figures \$11,600,000. This great work has only recently been completed by the construction of the canal from Tancarville to Havre, which has cost \$3,860,000. The object has been to obtain at all times a depth of 10½ feet, affording shipping an available draft of 9 feet 11 inches, while establishing the necessary arrangements for active and easy navigation.

In the 155 miles which separate Paris from Rouen there have been constructed nine stations with removable and movable dams for the drainage of superfluous water, as well as locks to insure in ordinary times the regu-



larity of navigation. At each dam there is a large lock affording in the sluice an available length of  $462\frac{1}{2}$  feet and a width of  $55\frac{1}{4}$  feet, and also a smaller lock affording in its sluice an available length of  $136\frac{1}{2}$  feet and a width of  $28\frac{1}{2}$  feet. The results of these works are already considerable, for in five years—from 1886, the year of their completion, until 1891—the annual traffic on the lower Seine has increased from 217,000,000 to 399,000,000 “mile-tons.”<sup>a</sup>

The character of the boats and their means of propulsion have likewise been transformed. Besides the ordinary canal boats, which carry, at the maximum, 300 tons, specially large barges up to 1,000 tons in size have been constructed. Steam is exclusively employed for navigation; it alone operates the very complete output of towboats, using chains and magnetic adherent cables, as well as the tugs and coasting boats, which are in regular communication with London.

One remarkable feature of the lower Seine navigation is the regularity and swiftness of transportation. In this respect there are boats between Paris and Rouen which compete with the railway.

The price of freight between Rouen and Paris was, in 1890, upstream,  $71\frac{1}{2}$  cents per ton, and downstream,  $51\frac{1}{2}$  cents per ton.

#### IMPROVEMENT OF THE RHONE.

The improvement of the Rhone from the junction of the Saone at Lyon to the sea has been undertaken with an entirely different idea. Over a distance of 205 miles the improvement of the open river has been accomplished by a series of works wisely conceived and accurately executed. Before the works were commenced, in 1880, the minimum low-water mark was  $15\frac{1}{4}$  inches. During the 182 days of the year only did the available draft exceed 63 inches, within which time there were included 101 days during which it was more than 78.7 inches.

After twelve years of persevering efforts and an expenditure of \$9,000,000 the following results have been obtained: The channel has been corrected; the falls have been lengthened, lessening the impetuosity of the rapids; dangerous rocks have been removed; the minimum draft now measures 55 inches, and there is an available draft of 63 inches during at least 354 days, and more than 78.7 inches during 310 days of the year. The only obstacle which the Rhone still presents to navigation arises from the violence of the current. It is hoped to remedy this by establishing a series of relays, fitted out with special tugs, drawn upstream by cables, to be wound around fixed drums operated by steam power. These cables would unwind for boats going downstream, and would allow an easy traction power, from which the best results are expected. The day, therefore, is soon coming when the Rhone, which seemed unconquerable, will be easily navigable, and will have an immense traffic.

<sup>a</sup> This expression “mile-ton” means the carriage of 1 ton over the distance of 1 mile. We should be careful, however, not to understand it as meaning a certain number of tons per mile. For instance, 399,000,000 mile-tons does not mean that number of tons carried per mile; that figure is, on the contrary, the product of the total number of tons of merchandise multiplied by the total length of the distance traversed. Thus, if the total of goods transported amounted to 5,500 tons and the distance carried was 50 miles, we should have a mile-tonnage of 275,000 tons. This definition should be borne in mind wherever the phrase appears in the course of this report. The original expression employed in French is “tonne-kilométrique.” Mile-ton is the nearest equivalent phrase, the necessary reduction from kilometer to mile having been made.

The navigation of the Rhone is destined to immediately serve very important local interests. It is, moreover, impossible to estimate the importance of this route for international traffic. The Rhone, suitably connected on the one hand with Marseille by a direct canal, and on the other with the navigable water courses of France, Belgium, and Germany, may be destined to become the principal commercial artery of northwestern Continental Europe for connection with the countries of the Mediterranean, the Indian Ocean, and the Far East.

#### DEVELOPMENT OF FRENCH CANALS.

The works executed upon the French canals, being almost exclusively in the line of improvement, appear comparatively modest alongside of the great improvement of the Seine and Rhone. The change accomplished in the last fifteen years, however, is not less considerable, and is in proportion with the hundreds of millions which have been devoted to that purpose. The object has been to reduce all canals of general importance to one single type, so as to render them practicable for the largest boats in use on French canals. The type of boat which predominates is the Flemish pinnace, or Walloon boat, of 300 tons. Its dimensions are: Length, 126 feet; width, 16¼ feet; draft, loaded, 5¼ feet. Boats of this type figure for 80 or 90 per cent of the total upon the northern and eastern canals. To permit the passage of these boats the sluices measure in available space: Length, 126 feet; width, 17 feet. The legal dimensions of the great French canals are not less than 32½ feet in width at the bottom, 52½ in width on the water surface, and 6½ feet draft.

In 1878 only 288 miles of canals satisfied these conditions. In 1893 there were 1,353 miles. Such were especially all the canals of northern and eastern France. For a great many canals, moreover, these measurements have been increased, by reason of the importance of their traffic. Thus the canal from the Oise to the Aisne has a width of 32½ feet at the bottom and a draft of 7½ feet. The Scheldt Canal has a width of 36 feet at the bottom and a draft of 7½ feet. The St. Quentin Canal, whose depth is the same, has a width of 39½ feet. Upon certain canals the traffic is enormous. There pass, for instance, over the St. Quentin Canal, on an annual average, 3,500,000 tons of merchandise, and in some parts exceptionally frequented as much as 3,800,000 tons. The total annual traffic, therefore, for this single canal amounts to about 300,000,000 mile-tons, which is equal to almost half of the total traffic of all the Belgian waterways united. The traffic per mile is about 5,000,000 tons. The St. Quentin Canal has a length of 58 miles and 35 locks. At its summit-level pond there are two subterranean passages, 3,609 and 18,700 feet in length. There is, moreover, a series of narrow passages in cuttings, with curves of short radius and great angular development. In order to meet the exigencies of such an important traffic upon canals where navigation is very difficult, the authorities have established a series of intelligent and practical regulations. Upon the northern and eastern canals and canalized rivers towage by hand power is prohibited for loaded boats, and tolerated for empty boats only on condition that it be done by men of the crew. Towage on canals is mostly done by horses. On certain canals, as on the canal parallel to the Oise, private companies are established which furnish horses at a fixed price and by contract. On other canals, as on the St. Quentin Canal,

the authorities have organized the towage along the canal and let it out to contractors upon certain stipulated conditions and by public adjudication. Finally, public authority itself operates the mechanical traction in use upon certain summit-level ponds which present exceptional difficulties for navigation. In this manner chain towage is operated on the summit-level pond of the St. Quentin Canal, on that of the canal connecting the Marne with the Rhine, in the tunnel of Ham, situated on a branch of the canalized Marne; and on the middle searp in the Douai passage. The Government is about to establish the system of funicular towage invented by Maurice Levy upon the Aisne-Marne canal in the Mount Billy tunnel near Reims. Last year it inaugurated, with remarkable success, electric towage—Pouilly system—upon the summit-level lake of the Bourgogne Canal, which includes a tunnel 10,829 feet in length.

Let us not forget the abolition of tolls voted in 1880; then the full importance of the works and useful measures decreed by the French Government in favor of the development of interior navigation will be easily understood. The latter has already largely profited by the favors which have been granted it.

From 1,247,095,000 mile-tons, which represented in 1880 the transportation movement upon French navigable waterways, the figures have risen to 2,117,400,000 mile-tons in 1891, while the price of freight per ton and per mile has dropped to three-tenths of a cent, and even less for long distances.

### HOLLAND.

Interior navigation has not so great an importance in any other country as in Holland. There the boat is the predominant factor in transportation. Besides the admirable network of rivers which pass through the country, innumerable artificial navigable ways thread it. The system of canals for navigation has alone a development of 2,244 miles, while all the railway lines have only a total length of 1,511 miles.

It is, however, to be remarked that this system of navigable ways branches out very slightly into other countries. Its connections do not extend beyond such communications as are established by the Rhine, the lower Scheldt, and the Bois le Duc-Maestricht Canal. The last, indeed, only supplements the navigation of the Meuse.

To maintain an influential commercial situation and to consolidate the sources of native activity, the country has applied a large portion of its means to the development of its shipping and seaports. Rotterdam and Amsterdam claim to handle almost exclusively the important maritime trade originating in the rich industrial regions adjacent to the valley of the Rhine. The improvement of navigation toward and upon the Rhine forms an essential part of the programme; the present situation has been attained only after long and laborious work.

#### NAVIGATION FROM ROTTERDAM TO THE RHINE.

The Rhine, coming from Germany, crosses the Dutch frontier near Lobbits. About 6 miles lower down it divides into two branches, of which the more important in respect to navigation, the Wahal, passing by Nimeguen and Eich, mingles with the Meuse at Wondrichsem, 58 miles from the frontier. From their point of junction the Wahal and the Meuse continue, under the

name of Meerwede, to Hardinxveld, several miles lower down, where there is another separation of their waters. The lower Meerwede flows on to Dordrecht, and from there to Rotterdam under the name of the Old Meuse and the "North;" the new Meerwede serves only as a great artificial drainage way to conduct the waters toward the Hollandsch Diep, where they pass under the well-known bridge of Moerdyk.

The course of the Rhine, including the Wahal and the Meerwede, has undergone important transformations. Instead of an irregular water course—strewn with islets and sand banks, presenting a series of shoals and deceptive channels, very often affording at low water only a depth of 1 meter or less—there now exists one of the most beautiful navigable ways to be seen. Its normal width is 1,180 to 1,312 feet, and the depth at low water, which will be increased everywhere to at least 9 feet 10 inches, is already 8 feet 10 inches, even when the depth registered on the bank at Cologne is only 5 feet, an event which occurs on the average, not more than ten days in the year. The width of the navigable channel is 328 to 492 feet. The Meerwede has to-day a depth of 9 feet 8 inches or more to Dordrecht, and beyond the depth continues to increase to Rotterdam.

The works of improvement projected are chiefly the fixing of a minor bed by means of submerged piles and dredgings for the establishment of the channel. These improvements have cost, for the Upper Rhine, \$569,871.10; for the Wahal, \$5,028,788.70; for the Meerwede, \$4,786,400, and for the Old Meuse, the North, the Mollegat, and the Spree, \$1,002,152, which make a total sum of nearly \$11,500,000. Other expenses are still to be incurred for finishing and consolidating the improvements heretofore made. Important dredgings and supplementary works at St. Andre are especially in view. In order to prevent any mixture of the waters of the Meuse with those of the Wahal, there is projected a new drainage course destined to carry off the water of the Meuse into Hollandsch Diep. In this manner navigation from Rotterdam to the Rhine will not be influenced by the changes in the Meuse. The ice floes which come down at the breaking up of this river will likewise be diverted from Rotterdam. From this description it is seen that the Dutch are not neglecting any means of increasing the advantages and facilities of navigation between Rotterdam and the German ports of the Rhine.

#### NEW CANAL OF THE MEERWEDE.

Amsterdam, which has made for its port as many sacrifices as Rotterdam, had for a long time good communication with the Rhine by the Cologne Canal. This navigable way, formed by a series of special canals, the last of which was constructed in 1825, placed Amsterdam in communication with the Lek and the Meerwede. Its total length was 52 miles; the width at the bottom measured 42½ feet, and the depth was 8 feet. It was practicable for Rhine boats measuring 220 feet in length, 24½ feet in width, and having a draft of 6 feet 10 inches.

For several years past, as is well known, the dimensions of the Rhine boats have been increasing. They now frequently reach 286 feet in length and 34½ feet in width, with a draft of 8½ feet, their tonnage being 1,500 metric tons. A barge has recently been constructed at Slikkeveer which is 285½ feet in length and 35¾ feet in width, with 8½ draft and a carrying capacity of 1,750 metric tons.

In these conditions the Cologne Canal was considered insufficient, and has been replaced by the new canal from Amsterdam to the Meerwede. The greater part of the canal—from Amsterdam to the Lek, over a distance of 29 miles, is entirely new. On the other hand, the portion between the Lek and the Meerwede is a transformation of the former Cologne Canal. By the new canal the distance from Amsterdam to the Meerwede has been reduced to 44 miles. In certain portions of the canal the level is variable, but it offers always at the least a draft of 10 feet. The width at the bottom is at least 65½ feet. The locks at Utrecht, Vreeslyk, Vianen, Heenenhoek, and the Meerwede are 393½ feet long and 39½ feet wide. The twin locks of Amsterdam are 46 feet wide. This superb canal cost \$8,106,000; it was opened for traffic May 1, 1893.

#### DEVELOPMENT OF TRAFFIC.

The daily increasing importance of navigation between the Dutch maritime ports and the German ports of the Rhine amply justifies the considerable sacrifices which Holland is making to improve its communications with this latter river.

According to observations made at the German frontier station of Emmerich, the total trade with Holland and Belgium showed a movement, in 1881, of 26,803 boats, of which 17,894 were under the Dutch flag; in 1892, of 38,024 boats, of which 30,694 bore the Dutch flag. The 38,024 boats of 1892 represented an available tonnage of 11,975,389 cubic yards.

The traffic by the Rhine between Germany and Holland alone included a movement of 4,654,370 tons of merchandise in 1890 and of 5,423,418 tons of merchandise in 1893, an increase of 769,043 tons.

During the same years the traffic by water between Germany and Belgium amounted to 1,165,456 tons of merchandise in 1890 and 1,310,033 tons of merchandise in 1893, being an increase of only 144,577 tons of merchandise.

### GERMANY.

#### THE GERMAN RHINE.

The Rhine is probably the most important interior waterway of Germany. Considering the relations with Dutch and Belgian ports, the total traffic of the Rhine attained in 1892 the figure of 20,793,000 tons of merchandise, of which total 16,480,000 tons represented interior transportation alone. In 1882 the total traffic was only 10,150,000 tons. The traffic therefore doubled in ten years.

In Germany the public works for the improvement of the Rhine are aiming to obtain between Mannheim and St. Goar an available depth of 6 feet 6½ inches; between St. Goar and Cologne, a depth of 8 feet 2½ inches, and below the last-mentioned city a depth of 9 feet 10 inches at the time when low water marks there only 4 feet 11 inches. Above Mannheim up to Strasburg there is only an available depth of 4 feet 4½ inches to 4 feet 11 inches, and sometimes, at low water, even less. Rhine boats are now frequently running with partial cargoes up to Strasburg. In this case they still carry from 300 to 600 tons of merchandise. With much less difficulty small boats can ascend the Rhine as far as Hunningen, at the gates of Basel.

Towing by steam apparatus placed on the banks is organized between Bonn and Bingen, while steam-tug towing, which every day is on the increase, is

strongly competing with it. The prices of tug towing upstream do not exceed on the average \$0.00875 to \$0.009 per ton for every mile. The fleet which carries on the traffic of the Rhine counts to-day 8,248 boats, of which number 7,530 are ordinary boats, representing a tonnage of 1,531,284, and 738 are steamers, whose total tonnage is 32,204. The value of this fleet is estimated at \$4,632,000, and it employs a force of 21,678 men as crews.

One remarkable feature connected with the navigation of the Rhine is the development and perfect outfitting of the ports which are established along its route. Of forty-one ports of some importance, twenty-eight are connected with railways and provided with all the appliances necessary to expedite the transshipment of merchandise from boats to cars and vice versa. In respect to management and appliances, the ports of Ruhrort, Dusseldorf, Cologne, Mayence, Mannheim, and Frankfort on the Main have not any reason to be envious of the most modern seaports. Quays, sheds, warehouses, cranes, granaries with elevators, and silos for grain, separate establishments provided with tanks for petroleum—everything exists to facilitate traffic and reduce to a minimum the cost of handling and warehousing. The construction of the Rhine ports is, however, rather difficult by reason of the variations in the level of the river, which sometimes rises 18 to 22 feet, as most of the basins and floating docks are in free communication with the river. The wharves and talus are of costly construction. Besides, the basins and protected places must be large enough to serve as places of refuge during great floods and the breaking up of ice. These circumstances, as well as the occurrence of very low water, prevent or at least seriously hinder navigation on an average during thirty-seven days per year.

#### THE ELBE.

Interior navigation is also thoroughly organized on the Elbe, which, together with its tributary, the Moldau, forms to-day a navigable way of 483 miles. Since the completion of the task of rectification the Elbe contributes greatly to the prosperity of the port of Hamburg. At low water the swiftness of the current varies from  $1\frac{1}{2}$  to 7 feet per second, and increases to 10 to  $11\frac{1}{2}$  feet per second at high navigable water. Even in this latter case the draft of boats can not exceed 4 feet 6 inches, while at low water the possible draft is reduced to 21 inches on the Austrian portion, and does not amount to more than  $31\frac{1}{2}$  inches between Magdeburg and the junction of the Havel, above Hamburg.

In spite of the unfavorable conditions, the average price of freight per ton per mile is only \$0.00388 upstream and \$0.00291 downstream. The boats in use are as much as 197 to 230 feet in length and 28 to  $32\frac{3}{4}$  feet in width, with a capacity of 15,900 to 26,500 cubic feet. Traction is supplied by means of chains from the banks or by steam tugs. Steamboats, known as "express transports," carry 150 to 200 tons of merchandise and tow a barge of 200 to 250 tons. They cover the distance of 392 miles between the Austrian frontier and Hamburg in three days; in ascending the stream they require eight or nine days. The rectified Oder and the canal uniting the Oder and the Elbe, which is 143 miles in length, with 25 locks, and follows partially the course of the Spree, constitute beautiful navigable ways in spite of their shallow draft. The lock of Mühlendamm, 377 feet in length and  $31\frac{1}{2}$  feet in width, was opened last year. Its completion brought to a conclusion

the improvements in the Berlin section, for which the municipality contributed nearly \$2,000,000. Boats of 500 tons can now circulate between the Elbe, the Spree, and the Oder.

#### THE NEW PRUSSIAN CANALS.

Besides the rivers and canals of the March, of which we have just spoken, and the North Sea and Baltic Canal, recently opened, North Germany does not possess any artificial navigable way of importance. As other countries have done, Prussia has presumed upon the economic value of railways. It has been found necessary that railways should carry a large car of coal from Westphalia to Bremerhaven for \$10.13, which for distances of 186 to 279 miles only amounts to \$0.0038825 per ton per mile, and it was not until industry was forced to demand rates below the cost of working the railways that the necessity was recognized of completing the economic system of the country by the establishment of a well-arranged series of canals. The programme of these works is drawn up, and the period of construction has commenced. We are accustomed to see the Germans, after they have adopted a programme, bring to its execution a thoroughly scientific spirit, combined with perseverance and real patriotism. Apt to profit from the experience of others, they know how to give to their creations a remarkable degree of perfection and common sense. The examples which they have furnished in this respect in the organization of their great industries, in the management of their ports, in the creation of their powerful merchant marine, are once more displayed in the construction of a system of navigable ways recognized as necessary to the industrial and economical expansion of their Empire.

This programme aims principally to connect with each other the great natural arteries of the Rhine, the Weser, and the Elbe. In the beginning, it suffices to open an economic navigable route between the industrial regions of Westphalia and the German ports of the North Sea by the construction of a canal from Dortmund to Emshafen, a project now under full headway.

#### THE DORTMUND-EMSHAFEN CANAL.

The distance from Dortmund to Emshafen will be 158½ miles. Strictly speaking, the canal extends only from Dortmund to Meppen. From Meppen to Emden the course of the Ems is to be canalized for this purpose. The canal will have a width of 98½ feet at the water level and 59 feet at a depth of 8½ feet below the level. In the excavated sections the bed is provisionally fixed at this depth of 8½ feet under the water line, but in the embanked sections the cunette is deeper; the bed is 11½ feet under the water level, and even there a width of 46 feet is maintained. The available dimensions of the locks are: Length, 240 feet; width, 28 feet 2 inches. The miters are placed at a depth of 9 feet 10 inches under the water level. With this depth the canal will be practicable for boats carrying 600 tons, and if later it should be deepened so as to employ the entire capacity of the locks, it will receive boats of 700 to 800 tons.

The difference in level between the canal at Dortmund and the North Sea at Emden is 228 feet. This fall is overcome to the extent of 81 feet by a plunge elevator of the Gruson system, established 10 miles from Dortmund, and by nineteen sluice locks scattered throughout the entire length of the canal. These locks will all be provided with hydraulic-pressure operating gear, which will considerably hasten the operation of gates and sluices.

## THE DORTMUND-RHINE CANAL.

The canal from Dortmund to the Ems, which a branch prolongs to Herne, is to be continued to the Rhine in such a manner as to connect Ruhrort and Duisburg with Emshafen. At Bevergern, situated almost halfway between Ruhrort and Emshafen, the great central canal diverges. This will extend to Magdeburg and will establish the junction between the Rhine, Weser, and Elbe.

It is proposed to commence very soon the section from Herne to the Rhine. The distance is only 25 miles, but in this all the difficulties are accumulated. The section passes through the busiest industrial region of Westphalia, and lively rivalries have developed among the metallurgic and coal companies respecting its route. This latter is rendered most difficult by reason of the declivity of the country, as well as by the permeability of the ground in the zone of the mining concessions.

In order to pass from the Rhine to the summit-level pond, whose water level is  $183\frac{1}{2}$  feet above the North Sea, there have been constructed two locks of  $16\frac{1}{2}$  feet fall, and two Gruson plunge elevators, with a fall of 32.5-6 and 46 feet, respectively. The section of the canal and the constructive works will have the same dimensions as in the canal from Dortmund to the Ems. The industries of Westphalia are still, however, urging upon the Government to enlarge these dimensions so as to permit the passage of the large Rhine boats. They ask that the locks may be 279 feet in length and  $34\frac{1}{2}$  feet in width. The expense of construction of this section of the canal is estimated at \$10,000,000.

## THE RHINE-WESER-ELBE CANAL.

The central canal, as we have said, diverges midway from the Ruhrort-Emshafen Canal. It will have a length of 224 miles between Bevergern and Magdeburg. This canal is destined not only to have an important transit trade, but also to serve a very large local traffic between Osnabrück, Minden, Hanover, Peine, Brunswick, and Magdeburg. According to the present plan of construction, there will be only four locks and one elevator. The cities mentioned which are not immediately on the main canal will be connected by branches. These will be extended to Osnabrück, Hildesheim, Peine and Brunswick. The dimensions of the locks and the constructive works will be the same as in the Dortmund-Ems Canal. All known improvements and appliances will be installed to expedite navigation and facilitate traffic. The expense is calculated at \$3,475,000.

## SOUTH GERMANY AND ALSACE-LORRAINE.

In South Germany and Alsace-Lorraine efforts are likewise being made to develop the means of economical water transportation. The canalization of the Main was finished in 1888 as far as Frankfort, over a distance of 22 miles. The draft, previously only  $2\frac{3}{4}$  feet, has been increased to 8 feet  $2\frac{1}{2}$  inches. The locks constructed in 1886, with a length of 279 feet and a width of  $34\frac{1}{2}$  feet, have been lengthened. They are now 804 feet long. The expense of canalization, supported by the Government, amounts to \$2,000,000, while the city of Frankfort has expended \$1,640,000 for the preparation and outfitting of its port. The traffic, which in 1886, the year of the inauguration of the port, was 156,000 tons, had in 1891 increased to 577,000 tons.

Much is said of the canalization of the Moselle, which is the principal tributary of the Rhine. Canalized already above Metz, it would be trans-



formed in its lower portion—180 miles in length—into a beautiful, practicable waterway, navigable for large Rhine boats. The proposed locks would have a length of 279 feet, a width of 32½ feet, and a draft of 8 feet 2 inches. The expense is estimated at \$3,570,000, but appears small in comparison with the economic results which are expected. On the other hand, an improvement in the navigability of the Rhine itself above Spire up to Strasburg will probably be accomplished in a short time. The canals of Alsace-Lorraine will then be placed in direct communication with the great navigation of the Rhine. These canals, 269 miles in length, have not undergone any modification since 1870. By its insufficiency the waterway system of Alsace-Lorraine formed a gap among the French canals. This need the German Government has undertaken to fill. It may be expected that within three years the Alsace-Lorraine canals will have the usual dimensions and constructive works of French canals, so that they will be practicable in their entirety for large inland boats.

#### BELGIUM.

The geographical and economic resemblances which exist between Belgium, Holland, and France are too great not to have occasioned the same needs and the same methods of transportation. Belgium is accordingly liberally provided with navigable ways.

The length of the Belgian system measures 1,229 miles, of which 730 miles are navigable for boats of 300 tons. In France there are 2,555 miles of canals of this class. The greater proportion of Belgian canals is, however, old, and the period of great works may be considered as closed. The canals from Brussels to Willebroeck, from Louvain to the Rupel, from Ghent to Terneuzen, from Ghent to Bruges, from Brussels to Charleroi, and from Maestricht to Boise le Duc, the canalized Sambre, the greater part of the coal canals, and numerous canals of minor importance were constructed before 1830.

#### THE MEUSE.

The most important work executed since 1830 has been the canalization of the Meuse. From the cannon foundry below Liege to the French frontier the distance is 70 miles, and the minimum draft obtained is 6 feet 10½ inches. The section from Liege to Namur, executed from 1853 to 1867, includes eight locks of 186 feet in available length and 29 feet 6 inches in width, as well as three large locks like those of the section between Namur and the French frontier. This latter section was finished in 1880, and comprises nine locks of 328 feet in available length and 39½ feet in width. The entire work cost nearly \$5,000,000. Large boats frequenting the Meuse have a tonnage of 2,500 to 2,800 cubic feet.

#### THE MEUSE-SCHELD T CANAL.

Supplementary to the canalized Meuse, there was constructed in 1860 the canal from the junction of the Meuse to the Scheldt, with a branch to Bocholt on the canal already existing between Leige, Maestricht, and Boise le Duc. The canal from Bocholt to Antwerp is 53½ miles in length, with a draft of 6 feet 10½ inches and a width of 32¾ feet on the bottom. The locks, numbering seventeen, have a length of 164 feet and a breadth of 23 feet. The maximum tonnage of boats which frequent this canal is 300 to 382 tons.

## THE CHARLEROI-BRUSSELS CANAL.

Among present enterprises we should mention the enlarging of the canal from Charleroi to Brussels and the construction of the Central Canal. Commenced in 1875 and in 1882, respectively, they are progressing with remarkable slowness. The Charleroi-Brussels Canal measures in length 45 miles, of which 15 miles, from Charleroi to Seneffe, have been enlarged to the width of  $34\frac{1}{2}$  feet on the bottom and provided with twelve new locks of the length of 127 feet and the width of  $16\frac{3}{4}$  feet. The 30 miles separating Seneffe from Brussels are still to be completed. Forty-three locks exist in this portion. These locks, of antiquated pattern, measure only 74 feet in length,  $8\frac{1}{2}$  feet in width, and  $6\frac{1}{2}$  feet in depth. The boats, called "Charleroi buckets," which can pass, carry only 70 tons.

## THE CENTRAL CANAL.

The Central Canal, whose economic interest has considerably lessened, descends from Houdeng, at the end of a branch of the Charleroi-Brussels Canal, to Mons. Its total length is only 13 miles. It is now being constructed with a width at the bottom of  $34\frac{1}{2}$  feet and a draft of  $6\frac{1}{2}$  feet. It will later be deepened by  $1\frac{1}{4}$  feet. The difference in level between Houdeng and Mons is  $293\frac{1}{2}$  feet. The first section of the canal, already completed from Mons to Obourg, overcomes within 8 miles a difference of level of  $76\frac{1}{4}$  feet by means of one lock of  $7\frac{1}{2}$  feet in fall and five other locks of  $13\frac{3}{4}$  feet in fall each. These locks have an available length of 133 feet and a width of  $16\frac{3}{4}$  feet. They are provided with all possible appliances. The second section, from Obourg to Houdeng, passes over coal fields, and must, within a distance of less than 5 miles, suffer a difference in level of 217 feet. To effect this purpose, there have been constructed four elevators fitted out with hydraulic pistons, the first three for a fall of  $55\frac{1}{2}$  feet, and the fourth, at Houdeng, which is completed, for a fall of  $50\frac{1}{2}$  feet. The Houdeng elevator is one of the most remarkable productions of human industry.

## RECENT WORKS.

Some works have been recently executed upon the Scheldt and the Meuse. The dams heretofore existing above Ghent have been replaced by sluice locks 137 feet in length and  $18\frac{1}{2}$  feet in width. At the same time the course of the river has been straightened. The work of regularization has likewise been pursued below Ghent, where the river is subject to the influence of the tide. While formerly the section of the river under water, when flowing at its full level, was 721 square feet and the grade 6.96 inches to the mile, this section now measures 1,216 square feet, and the grade per mile is 9.29 inches. \* \* \*

## BENEFIT OF CANALS.

Railway tariffs are badly adapted to commercial fluctuations. In this respect water carriage presents an incomparably greater elasticity. Waterways also create a new competition and often cause railways to reduce their tariffs. It is a happy method of forcing the hands of railway monopolies. Here is the heart of the question. The interest of the country is to have its transportation at the cheapest price possible. In this age especially, when the sharpness of international competition seems not to know any limits, carriage at the lowest price possible is an absolute necessity. Now navigable

waterways afford an economical method of transportation par excellence. Not only do they prevent the exaggeration of rates by railways, and, indeed, often produce reductions which permit certain industries to compete in foreign markets, but in many cases they also permit the operation and development of natural riches, mines, and quarries, which, by their remote situation, can not incur the comparatively high freights of railways in bringing their products to market. This means of transportation is strongly organized on the European continent.

#### CAUSES OF THE DEVELOPMENT OF ROTTERDAM.

Rotterdam is to-day certainly the most formidable competitor of Antwerp. How is it that the amount of merchandise passing through Rotterdam has tripled in fifteen years? Neither the superiority of the port and its appliances nor its moderate charges suffice to account for this growth. The difference in rates is only a few fractions of a cent, which, though something, is very little compared with the difference in interior freight rates. To understand the situation we should know that the development of traffic at Rotterdam is directly connected with the industrial growth of Westphalia and Rhenish Prussia and the expansion of their commercial relations with countries beyond the seas. Among the imports we find more than 1,000,000 tons of minerals, and among the exports more than 2,000,000 tons of coal. Still, Holland neither consumes minerals nor produces coal. But the Dutch have admirably understood how to attract German transit trade. They have constructed at Rotterdam the most powerful apparatus existing in any continental port for the mechanical handling and loading of coal. The cars loaded with coal are successively drawn upon the platform of an Armstrong hydraulic elevator, which lifts them 30 feet above the ground. At this height the wagon is inclined so that the coal immediately slides upon an inclined plane into the hold of the vessel. In this manner, within one hour, 20 carloads, or 200 tons, of coal can be discharged. The charge is 4 cents per ton, including everything from the time the car leaves the railway track until it is returned. During 1893 113,900 tons of coal and coke were handled. A new elevator to lift cars of 25 tons to the height of 40 feet is being constructed.

#### INFLUENCE OF RHINE NAVIGATION.

But it is the Rhine which has become the principal factor in the prosperity of Rotterdam. To see how closely its maritime traffic is connected with the navigation of this river, let us examine the movement to and from Rhine ports. In a previous table we have already noticed that 4,422 ships of 3,153,099 tons entered the port of Rotterdam in 1892, and 4,481 vessels of 3,614,654 tons in 1893. The amount of merchandise imported was 4,278,849 tons and 4,936,896 tons, respectively, an increase of 658,047 tons. During these two years the traffic between Rhine ports and Rotterdam increased from 2,661,495 tons to 3,290,048 tons of merchandise, an increase of 628,553 tons.

Similar statistics for the port of Antwerp do not exist, but statements of the German custom-house at Emmerich indicate for 1892 a passage of 1,447,016 tons of merchandise between Germany and Belgium, and for 1893 1,310,033 tons. They likewise show that in 1892 4,863,853 tons of merchandise passed

through Emmerich between Germany and Holland. The amount for 1893 was 5,423,418 tons. There was, therefore, an increase in the traffic between Germany and Holland of 557,565 tons of merchandise, while between Germany and Belgium there was a decrease of 136,983 tons.

How can we explain the unfavorable situation of Belgium? First, by the extremely low rates of freight existing between Rotterdam and the Rhine ports. Frequently the carriage of a ton of mineral does not cost more than \$0.00155 per mile. The expense from Antwerp to Ruhrort is at least twice as much per mile. The following table shows the average cost of the transportation of cereals between Antwerp, Rotterdam, and Amsterdam on the one hand and the principal markets of the Rhine on the other:

FROM	To—								
	RUHRORT-DUISBURG.			COLOGNE-DEUTZ.			MANNHEIM.		
	Dis- tance.	Rate per ton.	Rate per ton per mile.	Dis- tance.	Rate per ton.	Rate per ton per mile.	Dis- tance.	Rate per ton.	Rate per ton per mile.
Antwerp.....	<i>Miles.</i> 203	<i>Dollars.</i> 0.76	<i>Cents.</i> 0.374	<i>Miles.</i> 259	<i>Dollars.</i> 0.89	<i>Cents.</i> 0.344	<i>Miles.</i> 421	<i>Dollars.</i> 1.21	<i>Cents.</i> 0.287
Rotterdam.....	134	.81	.231	191	.41	.214	352	.77	.218
Amsterdam.....	167	.48	.287	223	.63	.282	385	1.16	.301

Besides the extremely low rates of freight, the Dutch ports have a very important advantage in the superiority and regularity of their steam service. While at Antwerp there is only a single line—foreign, indeed—running to Frankfort and Mannheim, consisting of boats drawn by tugs, there are at Rotterdam and Amsterdam several rapid services with large vessels carrying 600 to 800 tons of goods. These boats require only three to four days to cover the 353 miles between Mannheim and Rotterdam, at a time which is scarcely lessened by the railways. Not only do these conditions compete with the Belgian waterways, but even the railroads are beginning to feel the effects. It is not natural to suppose that the merchants and manufacturers of the Rhine region will continue to pay a rate of \$3 to \$5 per ton by rail to Antwerp when they can ship by regular service to Rotterdam at \$1.40 to \$1.60 or less per ton. Nor is this competition limited to the few cities and ports situated immediately on the Rhine. Far different. The influence of the ports of Ruhrort and Duisburg extends over Westphalia; that of Dusseldorf and Cologne over Rhenish Prussia; that of Frankfort and Mannheim over Bavaria, Wurtemberg, Baden, Alsace-Lorraine, and Switzerland.

The improvements to be made upon the Rhine-Dortmund Canal, the Moselle, and the Upper Rhine to Strasburg will certainly increase the influence of Rotterdam in Westphalia, Alsace-Lorraine, and Switzerland. Let us look a moment at the price of freights. The rate for cereals from Rotterdam to Metz will not exceed \$1.15 per ton, and to Nancy \$1.35. At present, by the Belgian canals, the rate from Antwerp to Nancy is \$2.12. For Strasburg the situation will be the same. And what of the railways? How can they compete with such rates when they ask from Antwerp to Strasburg \$4.26 per ton for

cereals? For other goods the difference is proportional. Freight by rail between Antwerp and Strasburg is \$5.90 per ton, while by Rotterdam and the Rhine it is only \$1.93.

In this connection, as a conclusion to our description of Rhine traffic, it may be interesting to note the amount of commerce at some of its ports. At Frankfort on the Main, for instance, the tonnage increased from 155,956 tons in 1886 to 597,315 tons in 1890. The traffic at other ports of the Rhine in 1891 was:

	Tons.
Ruhrort .....	3,535,607
Mannheim .....	2,802,703
Duisburg .....	2,744,622
Ludwigshafen .....	819,970
Cologne and Deutz.....	570,983
Mayence .....	252,508

#### CONCLUSION.

From this review of the existing conditions of inland navigation in France, Germany, Holland, and Belgium, we have learned how thoroughly the system of interior waterways is organized, especially in Holland and the Rhine district. Belgium, although naturally in a superb situation for controlling the transit traffic between the countries southeast of her and those beyond the seas, finds her position seriously menaced. Rotterdam and Amsterdam on the one hand, Dunkirk, Calais, and Havre on the other, are making strenuous efforts to displace the commerce of Antwerp. Failure to maintain Belgian waterways up to the modern standard is largely responsible for this condition. It is not the intention here to go into the details of proposed remedies; suffice it to say that the subject of improved interior waterways is now being agitated. Measures will doubtless soon be taken to promote the best interests of Belgium. But, aside from the question of improvement, there is one element lacking to the prosperity of inland navigation—that is, want of freedom in the movements of commerce. The canal tollgate still exists in Belgium. It is a relic of history. France abolished it many years ago. It exists only in this country, and here its results are disastrously evident. When the tollgate and its keeper disappear, then Belgium can hope to compete with her neighbors as carrier of the commodities of other nations.

In this résumé, made as brief as possible, but unfortunately still too long, the effort has chiefly been to present a clear idea of the methods employed by the chief industrial nations of the Continent to secure economical, safe, regular and speedy transportation of their products to market, and to bring to themselves in like manner their necessary supplies from other parts of the world. Millions and millions of dollars have been spent and are still being spent by Germany, France, and Holland for this purpose. No sacrifice seems too great for them, and indeed the seaports, as we have seen, are not the only recipients of this bounty. They understand that the heart can not be in good order without healthy veins and arteries. Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, Dunkirk, Calais, and Havre are centers whence the great arteries of trade and commerce radiate, but every one of these ports depends, in turn, upon the thorough and complete organization of its tributary system of railways, rivers, and canals.

## CANALS OF THE UNITED KINGDOM.

[From "Highways of Commerce," issued by the Bureau of Foreign Commerce of the State Department, 1899.]

## LEEDS DISTRICT CANALS.

The lord mayor and the aldermen of York were appointed in 1462 conservators of the Ouse and other rivers connected therewith. During the five decades, 1828 to 1868, the traffic averaged about 110,000 tons per annum. The navigation in 1872 extended from 8 miles above York to the confluence of the Trent, Ouse, and Humber—60 miles.

The Aire and Calder were incorporated in 1699, and subsequent acts of Parliament were procured in 1774, 1820, and 1828. In point of construction and operation this has been regarded up to the present time as the model canal in England.

Up to 1872 there had been expended on this work more than £2,000,000 (\$9,733,000), out of which, borrowed and then due, there remained about £500,000 (\$2,433,250). Interest was paid on this sum before declaring dividends. The amount of share capital and debt is not limited by the acts of incorporation. Proprietors' interests are said to be estimated by the proportion borne to dividend. In 1872 it was stated that the Aire and Calder dividend had ranged up to that time from £40,000 (\$194,660) to £72,000 (\$350,388).

In 1872 reconstruction of the canal for the fourth time was taking place.

The canal was originally made 3 feet 6 inches in depth, and the locks were 60 feet by 15 feet by 3 feet 6 inches. Under the act of 1774 the locks were made 66 feet by 15 feet by 5 feet throughout the system. In 1820 the Goole Canal was constructed, with locks 72 feet by 18 feet by 7 feet, and under the act of 1828 these dimensions were extended to the whole navigation. Since the year 1860 a general improvement had taken place previously to 1883, with locks 21½ feet by 22 feet by 9 feet. At that date (1883) these changes lacked about three years' work of being complete as to the routes from Goole to Leeds and from Goole to Wakefield. The canal itself was then 66 feet wide. From 1860 to 1883 £600,000 (\$2,919,900) was said to have been expended in improvements and purchases of mill power and water rights, etc. Of this amount £100,000 (\$486,650) was spent on the port of Goole and £32,000 (\$155,728) in purchasing the Bradford Canal.

A summary given in 1883 makes the distances as follows:

Goole to Wakefield, 37 miles; Goole to Leeds, 36 miles; Barnsley branch, 12 miles (acquired in 1871); Bank Dale branch, 11 miles (Bank Dale, 18 miles from Goole to Selby).

Navigation of the River Aire to Rawcliffe and intermediate points not touched by the canal was also in the hands of the Aire and Calder, so that the total length of the undertaking, reckoning canal and river together, was about 80 miles.

Over the Aire and Calder proper, not including the Barnsley Canal, the traffic in 1872 amounted to about 2,000,000 tons, total; equivalent to 42,250,000 tons carried 1 mile. At the same period the rate of the Barnsley was about 250,000 tons per annum, and that of the Calder and Hebble 556,000 tons.

The gross tonnage of the Aire and Calder is given as follows: In 1838, 1,383,971 tons; 1848, 1,335,783 tons; 1858, 1,098,149 tons; 1868, 1,747,251 tons.

The locks of the Aire and Calder are divided; one length takes two boats and the other length takes one boat, so as to save the water. Three boats of the Leeds and Liverpool Canal will go through the Aire and Calder locks at once.

A large culvert extends alongside the lock, with one sluice at the upper end of the lock 7 by 5 feet (the ordinary sluice is 2 or 3 feet square), and at the lower extremity of the lock is another sluice. When that is closed and the lock is empty the upper sluice is raised. It is self-balanced, like a throttle valve. Three orifices open into the elongated lock, arranged so as to divide the boats and prevent their knocking together when they are in the lock. To empty the lock the upper sluice is closed, the lower one opened, and the water drawn into the culvert and discharged at the lower end. This plan is used instead of discharging the water at the gate. The sluices are practically self-acting; two turns of the sluice handle raise it and three turns lower it. The lock is said to be filled and emptied with much more celerity by this plan than in the ordinary way, by the gates.

By way of the Aire and Calder there are three routes from Hull and Goole to Liverpool, viz: (1) Through Leeds, by Aire and Calder, Leeds, and Liverpool; (2) through Wakefield, by Aire and Calder, Calder and Ribblesdale, Bridgewater, Mersey River; (3) through Wakefield, by Aire and Calder, Calder and Hebble, Sir John Ramsdin's, Huddersfield, Ashton, Rochdale, Bridgewater, Mersey River.

The distances are given as follows:

ROUTE.	Miles.	ROUTE.	Miles.	ROUTE.	Miles.
<i>No. 1.</i>		<i>No. 2.</i>		<i>No. 3.</i>	
Hull to Goole.....	26	Hull to Goole.....	26	Hull to Wakefield.....	63
Goole to Leeds.....	36	Goole to Wakefield.....	37	Wakefield to Cooper Bridge.....	13
Leeds to Liverpool...	128	Wakefield to Sowerby Bridge.....	22	Cooper Bridge to Ashton.....	24
		Sowerby Bridge to Manchester.....	33	Ashton to Rochdale Canal at Manchester.	4½
		Manchester to Runcorn.....	27	Manchester to Liverpool.....	42
		Runcorn to Liverpool..	15		
Total.....	190	Total.....	160	Total.....	146½

The Barnsley branch was purchased by the Aire and Calder in 1871. The 15 locks on this branch were subsequently lengthened from 66 feet, their length in 1871, to 85 feet, increasing the viable tonnage from 75 to 115. This took two years and cost about £7,500 (\$36,498.75), somewhat over £500 (\$2,433.25) per lock. It made the locks of the Barnsley Canal, in 1883, 85 by 15 by 6 feet. The Silkstone extension on this branch is now (1890) used merely for water supply, and is without traffic; it is 2 miles in length. It had formerly a large coal traffic on it.

The branch of the Aire and Calder from Bank Dale to Selby distributed to York, Tadcaster, and Malton, with considerable trade in 1883, which still continues.

The old line through Huddlesey and Snaith to the Ouse was in 1883 nearly disused on account of its circuitousness, and the locks remained at 5 feet, the depth of 1776. The new lines to Goole and to Selby had absorbed the traffic, leaving but a little in coal and timber to the old route. The good navigation through Whitley and Pollington is called the Knottingley and Goole Canal.

In 1883 vessels up to 167 tons burden were going on the line from Goole to Leeds or to Wakefield.

The principal tonnage in 1872 was coal, but they had also a large traffic in grain, stone, timber, dyewoods, and general goods.

There were two recognized systems of traffic on the Aire and Calder—the quick transit, or merchandise system, and the slow transit, or mineral system. The company acted as carriers in addition to being takers of toll, and they do so still. I learn from the company that they convey in the capacity of carriers and by means of flyboats (hauled by steam, so far as their own waters are concerned) large quantities of merchandise between the ports of Hull and Goole and Leeds, Bradford, Shipley, Bingley, Keighley, Skipton, Colne, Burnley, Accrington, Blackburn, Wigan, Liverpool, Waterfield, Dewsbury, Barnsley, Mirfield, Huddersfield, Brighouse, Halifax, and Sowerby Bridge. Through their agents, they say, they also carry to Rochdale, Todmorden, Littleboro, Heywood, Manchester, and other places. They say the rates of carriage charged by water are less than those of the competing railway companies.

The merchandise traffic of the Leeds and Liverpool Canal was leased to certain railway companies for twenty-one years, expiring in 1874. On certain percentages of liability the railways paid so much a year for the merchandise traffic, leaving the mineral traffic and the maintenance of the canal with the canal company. Since the termination of the lease, according to Mr. Bartholomew's evidence in 1883, from which I derive these facts, through rates for the Aire and Calder and the Leeds and Liverpool had been arranged. A reasonable and fair increase of traffic, more than was due to the general increase of the traffic of the country, had resulted.

The Leeds and Liverpool Company themselves had become carriers since the lease expired, and had carried merchandise traffic themselves largely.

A recent newspaper report makes an estimate of the amount expended on the Leeds and Liverpool Canal from the commencement of the undertaking to the present date, that is to say, from 1770 to 1889, and reckons the total sum at £1,500,000 (\$7,299,750), of which by far the greater part is deemed to have been contributed from savings out of revenue.

#### LIVERPOOL DISTRICT CANALS.

The principal canals in this district are the Shropshire Union Canals, made up of several canals, as stated below; the Leeds and Liverpool Canal, and the Manchester Ship Canal, formerly the Bridgewater Canal.

Originally they were built generally with sloping sides, but more recently the sides are perpendicular, and the towpath side is protected by a granite wall, the other side being simply earth, protected where necessary by piling.



The locks are chiefly of stone and brick, but latterly concrete is preferred for this. The lock gates are of elm, oak, or teak wood.

The Shropshire Union Canals afford the shortest and best canal route between the Mersey and the South Staffordshire and Birmingham iron districts, and the only water route between that river and Shropshire and North Wales, Cheshire, and Chester. They also join the North Stafford Canal at Middlewich, and thus provide water communication between the Shropshire Union system and North and South Staffordshire, and also Warrington and Manchester districts.

(1) Chester Canal, between the River Dee, at Chester and Nantwich, a distance of 20 miles, the statutory authority for which was given in 1772.

(2) The Ellesmere Canal, from Carreghofa, in Montgomeryshire, where it joins the Montgomeryshire Canal, to Hurleston, in Cheshire, where it joins the Chester Canal, with a branch from the Dee at Chester to the River Mersey at Ellesmere Port. The distance traversed covers 86 miles. The act of Parliament was passed in 1793.

(3) The Birmingham and Liverpool Canal, from Autherly, a point of junction with the Stafford and Worcester Canal near Wolverhampton, to Nantwich, where it joins the Chester Canal, with a branch to the Shrewsbury Canal at Norbury Junction, the distance covered being 53 miles. Authority for construction was given in 1826.

(4) The Montgomeryshire Canals, from Carreghofa (where the Ellesmere Canal begins) to Newtown, in Montgomeryshire, with branches. The distance covered is 25 miles. The authority for this was given in 1794.

(5) The Shrewsbury Canal, from Wombridge to Shrewsbury, in Shropshire, the distance covered being 22 miles, the authority for which was granted in 1793.

The whole of these canals were formed into the Shropshire Union Company in the year 1846.

The total length of the various canals forming the company's system is about 206 miles.

The canal from Nantwich to Ellesmere Port (its terminus), where it joins the River Mersey, is sufficient to pass lighters and flats carrying from 40 to 60 tons, and such craft are constantly employed upon it.

On other parts of the system narrow boats 7 feet wide are used, which carry from 18 to 30 tons, according to the depth of water. The depth of water varies from 3 feet to 4 feet 6 inches.

The locks on the canal from Chester up to Nantwich are broad, and admit two narrow boats at a time. On other lengths they are narrow.

In all districts the width of the waterway is sufficient to admit of two narrow boats passing at the same time, except through the locks, tunnels, and aqueducts.

### LONDON DISTRICT CANALS.

#### REGENT'S CANAL.

By courtesy of Mr. E. Thomas, the engineer and manager of the Regent's Canal, I am informed that, under the authority of the British Parliament, the canal was commenced in the year 1812 and occupied about eight years in construction, being open for traffic in the year 1820. It was constructed in the ordinary manner, but differs from other canals by having two locks at each variation of level, side by side, to economize consumption of water.

The Limehouse dock has a water area of 10 acres, and extensive quayage, with a ship entrance 350 feet long, 60 feet wide, and with sills laid 28 feet below Trinity high-water mark; also an entrance for barges 79 feet long, 14 feet 6 inches wide, with sills laid 22 feet below Trinity high-water mark.

The wharves and jetties in the dock are provided with hydraulic and other cranes for transshipping and loading coals and other goods up to 15 tons weight.

The dock, which is within and part of the port of London, is most conveniently situated on the north bank of the River Thames, about a half mile below the Shadwell entrance to the London docks;  $1\frac{1}{2}$  miles below London Bridge, and one-third of a mile above the Limehouse entrance to the West India docks, and is close to the Stepney station of the London and Blackwall Railway, which is reached by trains from Fenchurch street station in eight minutes; and trains run to and from this station to all stations on the Great Eastern Railway, and the London, Tilbury and South End, Thames Haven and London, Woodford and Ongar branches thereof, and also in communication with the trains of the North London Railway Company passing Bow station.

Screw steam vessels to and from Liverpool, calling at Falmouth, Plymouth, and Southampton, leave and arrive at the dock weekly. London agents, J. D. Hewett & Co., 101 Leadenhall street, and John Allen & Co., 150 Leadenhall street.

The jetties in the dock are capable of transshipping and weighing, with great rapidity and small breakage, coal from screw steamers and other vessels into craft for the River Thames and other inland navigation. The Regent's Canal communicates with the dock and River Thames, and is navigable for barges of 100 tons burden. It passes through Stepney, Mile End, Bethnal Green, Hackney, Shoreditch, St. Lukes, Islington, St. Pancras, Marylebone, and Paddington, in which last-named parish it communicates with the Grand Junction Canal.

Large warehouse accommodation and extensive wharf area for storing timber, stone, and other goods are provided within the dock premises.

The company is permitted under a sufferance license (Class B), received from the honorable board of customs, to receive into the dock and land upon the quays, or transship into craft for the river or canal, every description of goods and grain.

The facilities which are now afforded at this company's dock are strongly recommended to the notice of traders and lightermen on the Thames and the Regent's Canal, Hertford Union Canal, Grand Junction Canal, River Lee, and other inland navigations connected therewith, as considerable inconvenience, detention of vessels, and expense, also risk of damage to valuable cargoes, such as grain, etc., in barges, consequent upon navigating the River Thames, would be avoided by using the dock.

The Great Eastern, Great Northern, Midland, and London and Northwestern Railway companies have their goods termini on the banks of this canal, and the Great Western Railway upon the Paddington Basin.

#### GRAND JUNCTION CANAL.

This canal was constructed, under an act of Parliament, in the year 1873. The length of the main line and its branches is about 140 miles, and the carrying capacity of barges navigating the canal varies from 50 to 76 tons,

according to the craft and section of canal navigated. This company has power to charge toll for distances of about 100 miles of 16s. 10½d. per ton, but in point of fact the traffic will only bear a toll of 2s. 6d. a ton over that section, thus showing a large reduction that has now been effected on the expectant sources of revenue at the time of construction.

This canal, for 30 miles from the river Thames, at Brentford, Middlesex, was partly constructed by canalizing the rivers Brent, Colne, Gade, and Bulbourne, and is not much used for irrigating purposes.

#### THE SURREY CANAL.

The canal belonging to this company was constructed in the year 1807. The canal is a short one—only 4 miles in length, being part of a scheme devised in the early part of this century for communication from Rotherhithe, which is about 1½ miles from London Bridge, to Battersea, which is about 3 miles from London Bridge, but the plan was not carried out in its entirety, and the canal terminates at Camberwell and Peckham, suburbs of London. The canal was constructed for the class of barges ordinarily navigating the river Thames, and is camp sheeted for nearly its entire length, rendering the full width available.

The traffic consists entirely of barges engaged in supplying the wharves and premises on the banks of the canal with goods which enter the company's docks at Rotherhithe.

The premises on the canal are chiefly occupied as tar distilleries, chemical manufactories, and wood yards, and a large part of the revenue from the canal is derived from the dues on coals which are brought up the canal to the South Metropolitan Gas Company, whose works have a water frontage on the canal. The canal is virtually a part of this company's dock system.

Length of canal.....	miles..	4
Width at surface.....	feet..	58
Width at bottom.....	do ..	52
Number of locks.....		1
Lift of locks.....	feet..	3½
Length of locks.....	do ..	120
Average load .....	tons..	80
Maximum draft of boats.....	feet..	4½
Maximum width of boats.....	do ..	17½

#### SHEFFIELD DISTRICT CANALS.

The Sheffield and Tinsley Canal, the Dun Navigation, the Stainforth and Keadby Canal, and the Dearn and Dove Canal were constructed about one hundred years ago, and there has been but little improvement in them since they became the property of the Manchester, Sheffield and Lincolnshire Railway Company in the year 1849. The size of these canals is such as to limit boats and barges trading between Sheffield and the river Trent to a carrying capacity of about 80 tons each. The use of steam as a propelling power is prohibited, and the length of time required to pass between Sheffield and tide water averages about a week. The locks are small and numerous, and from the canal into the Trent only one boat can be passed through at a time, giving a total of only about twenty boats at each tide. In spite of this unfavorable condition, however, not less than 500,000 tons of through traffic pass the locks at Keadby in the course of a year.

The canals being in the possession of a railway company which reaches the same points between Sheffield and the coast, there is consequently no competition in rates of traffic between the two. Thus the railway company's rate on coal for shipment at Hull from South Yorkshire amounts to 2s. 10d. (69 cents) per ton, or double the rate charged by the Aire and Calder Canal over an equal distance from the West Yorkshire collieries to Goole.

### IRISH CANALS.

The canals and inland navigation enterprises in Ireland are of three classes, viz:

First. Those owned and operated by private companies or corporations. Under this head are the following: The Grand Canal, with a total length, including branches, 165¼ miles; the Barrow Navigation, partly canal and partly river, 42 miles; the Upper Boyne, all river, 6 miles, completed in 1800; the Lagan, mostly river, 26 miles; the Newry, canal and river, 35 miles; the Suir, all river, 16 miles; the Royal Canal, 96 miles. These, of course, are maintained out of funds belonging to their respective companies. From their importance, the Grand Canal, the Royal Canal, the Barrow Navigation, and Lagan Navigation will be considered separately and in greater detail further on. The improvements upon the routes described by the Upper Boyne, the Newry, and the Suir were largely accomplished by means of assistance in the forms of loans of public money, or by grants from general or special taxes. Some of these loans have been paid and some remitted. There is no considerable traffic upon these canals now, and the profits derived therefrom are small.

Second. Those owned and operated by the Government and maintained out of imperial funds. This class is composed of the following lines: The Lower Boyne, canal and river, 19 miles; the Maigue, all river, 8 miles, improved in 1751; the Shannon, chiefly river, 158 miles; the Tyrone, all river, 4 miles; the Ulster Canal, 44 miles. The improvement or construction of these channels, as the case may be, was accomplished by direct grants of the public funds and advances realized from local assessment. The latest reports rendered by the commissioners, under whose management are these several lines of navigation, show that the total annual receipts amount to £6,584, and the annual disbursement for expenses for all purposes to £6,192. Thus it will be seen that the receipts derived from rents, tolls, etc., make them a trifle more than self-sustaining. Of the lines mentioned, the Shannon Navigation and the Ulster Canal are the most important. The improvement of the former involved an outlay of £683,312, and the construction of the latter about £170,000.

Third. Those under the direction of local trustees. This class includes the Ballymore and Ballyconnell, mostly canal, 37 miles; the Lower Bann, mostly river, 50 miles; the Upper Bann, all river, 21 miles, and Lough Corrib, mostly river, 23 miles. The improvement or construction of these lines, as described, was also accomplished by grants of public money and advances secured in local taxation, amounting in the aggregate to about £600,000. These public works covered a period from 1845 to 1859. The group, as given above, is also a little more than self-sustaining. With the exception of the first mentioned, the latest figures show that the total annual receipts are £3,261, and the total disbursements are £2,553. As stated, these works are managed by local trustees, representing the property interests which are

contiguous to the several lines. In case of a deficiency, the difference is made up by means of local taxation. In case of a surplus, the local taxation is less by that amount. The system of management is the same as that which applies to public highways.

#### GRAND CANAL.

This is the most important artificial waterway in Ireland. Its main line extends from Dublin westward to the Shannon River, and from thence westward to Ballinasloe, with branches to the Liffey, Robertstown, Blackwood reservoir, Monastereven, St. James Well, Athy, Mountmellick, Edenderry, and Kilbeggan. Its summit level is 279 feet above sea level, which point is 26 miles west of Dublin. The locks upon this canal are 60 feet in length, 13 feet in width, and have 5 feet lift. Although steam is used somewhat, horses are used principally as the power for moving the boats. The traffic upon this canal amounts to 600,000 tons annually. The Grand Canal now earns for the shareholders £1 15s. on each £100 of the capital stock. The construction of the Grand Canal was commenced in 1753, and the main line was completed in about 1800. The line west of the Shannon River and the branches were opened in 1830. The entire work involved an outlay of £2,000,000. A considerable portion of this amount was made up by grants from special or general taxes and also by loans, a part of which has been repaid to the Government and a part of which has been remitted. The present capitalization of the company is £165,000.

#### ROYAL CANAL.

The Royal Canal proceeds northwesterly from Dublin to Cloondara, on the Shannon, with a branch to Longford; the total length of channel being 96 miles. Its summit level is 324 feet above sea level. It is fed from Lough Owel, near Mullingar. The dimensions of the locks are 70 feet in length, 13 feet in width, with 5 feet lift. The Royal Canal Company was organized in 1784. The first 46 miles of the channel was completed in 1813. The remainder of the work was completed in 1822. It received large assistance from the Irish Parliament, and from the Union after that was established. The total cost of the work was something over £1,900,000. In 1813 the original company became insolvent, the charter was forfeited, and the property transferred to the directors-general of inland navigation. Again, in 1845, the Royal Canal was transferred to the Midland Great Western Railway Company, the consideration being £298,050. An essential condition of the transfer was that the purchaser should maintain the navigation and not vary the tolls except with the assent of the lord lieutenant of Ireland. Being its own competitor, however, the company does not utilize the facilities of the canal to any considerable extent. The annual tonnage amounts to only 86,500, on an average.

#### BARROW NAVIGATION.

This route connects the Athy branch of the Grand Canal with the tidal part of the River Barrow, below St. Mullins, and affords water communication to Carlow, Leighlin Bridge, Bagnalstown, Goresbridge, and Graignamanna, and thence by tidal part of the Barrow to New Ross and Waterford. The work was commenced in 1759, and up to 1790 cost £80,769, about one-

half of which was derived from public sources. It also received other grants after the Union, but the exact amount is not available. There is considerable traffic upon this route, but I have been unable to get figures showing annual tonnage. The profits to the shareholders are moderate.

#### LAGAN CANAL.

This is owned by the Lagan Navigation Company. The works were commenced by the commissioners of navigation for Ireland, the expense being defrayed by a local toll on beer, ale, and spirits imposed by an act of 1753.

In 1771 prosecution of work was delegated to local commissioners, who raised money on the securities of the tolls. Afterwards these creditors were constituted a company by act of Parliament. The canal extends from Belfast to Lough Neagh, 26 miles, and has 26 locks, capable of passing lighters 62 feet by 14 feet 6 inches, with a maximum draft of 5 feet 6 inches.

The traffic is about 156,000 tons per annum, consisting of coal, Indian corn, timber, slates, brick, etc., and return cargoes from Lough Neagh of sand for building purposes.

The company is managed by a Belfast board of directors, with secretary and manager of works.

The company are not carriers. The lighters trading are owned by different individuals. Wherever the canal touches, railway rates are brought down to canal rates. Roughly, the effect in cheapening transportation would probably be about from 15 to 25 per cent, or perhaps even more.

#### ULSTER CANAL.

The works on this canal were commenced by the Ulster Canal Company under an act of 1826. Loans to the extent of £130,000 were made by the commissioners of public works in Ireland. In 1865 the canal was transferred to the commissioners in discharge of the debt. More money was expended on the canal, but under the commissioners it has been kept in such want of repair and want of water that there could be no traffic. By an act of Parliament, passed in 1888, it was transferred to the Lagan Navigation Company as a gift, with £3,500 toward cost of repairs, the company being obligated to keep it in order for the public, charging fees regulated by act of Parliament.

It is now being put in order. The canal extends from Lough Neagh to Lough Erne, 44 miles, and has 26 locks capable of passing lighters 65 feet by 11 feet, with a maximum draft of 5 feet, when in repair.

#### COAL ISLAND CANAL.

Commenced in 1732 by the commissioners of Ireland, its navigation continued in their charge until 1787, when the works were transferred to parties undertaking to complete and extend the canal. In 1800 the navigation came into the hands of the directors-general of Ireland, and between 1800 and 1831 the sum of £26,240 was expended upon the works. In 1831, on the abolition of the directors-general of Ireland navigation, the management was transferred to the commissioners of public works, in whose charge it has since continued, and a sum of £5,177 has been expended by them.

Under an act of 1888 it was transferred as a gift to the Lagan Navigation Company, with obligation to keep it in order for the public, charging tolls

regulated by act of Parliament. The canal extends from the Blackwater River, which runs into Lough Neagh, to the town of Coal Island,  $4\frac{1}{2}$  miles, and has 7 locks capable of passing lighters 62 feet by 14 feet 6 inches, with a maximum draft of 4 feet 9 inches. Traffic, about 15,000 tons per annum.

### SCOTCH CANALS.

The only system of inland navigation within the limits of the consular district of Leith (Edinburgh) is the Union Canal, an artificial waterway extending from Port Hopetown, in the western suburbs of the city of Edinburgh, to a junction with the Forth and Clyde Canal at Port Downie (a large basin at Lock 16), adjoining the town of Falkirk, in the county of Stirling.

The construction of the Union Canal was undertaken in the year 1817. It was opened in 1822, but as a property it proved a great failure. The returns from all departments—passengers, parcels, and miscellaneous goods, coals, stone, and other minerals, manure, etc.—proved much less than had been anticipated. The real returns during the seven years after opening did not amount to \$85,000 a year, while the estimated returns had been set down at \$275,000 a year. The canal was not intended for ship transit, but solely as a waterway of inland navigation for passenger traffic and merchandise between places on its own banks, and chiefly between Edinburgh and Glasgow, and therefore it was for a long period generally called the Edinburgh and Glasgow Canal.

The company owning it worked their business with great spirit, and adopted every available means in the endeavor to make their enterprise a paying one, or even to raise it to a fairly hopeful condition; but when the Edinburgh and Glasgow Railway was opened, February 18, 1842, it was seen that the canal could not long survive as an independent system of passenger and goods traffic between the two cities. A brisk competition was maintained for some time with little success, and ultimately, in 1849, the Union Canal was amalgamated with the Edinburgh and Glasgow Railway, both of which undertakings in 1865 passed into the hands of the North British Railway Company. The Union Canal, therefore, although still remaining as a work, is quite absorbed as a business in the interests of the railway.

The total length of the Union Canal, from Port Hopetown, at Edinburgh, to the junction with the Forth and Clyde Canal at Lock 16, is  $31\frac{1}{2}$  miles.

The medium width at top of bank is 40 feet; at surface of water, 37 feet, and width of water at bottom of canal, 20 feet. The depth of water is 5 feet.

There are 11 locks,  $12\frac{1}{2}$  feet wide. Depth of water on sill of locks, 5 feet 9 inches. Total rise or fall of locks, 10 feet 3 inches.

The traffic consists entirely in conveyance of coals, stone, bricks, and other minerals, and manure.

The present owners are merely toll takers, not carriers. Other people put on the barges or boats. The management of this canal is entirely in the hands of the North British Railway Company.

### THE FORTH AND CLYDE CANAL.

The Union Canal at its western extremity terminates in the Forth and Clyde Canal, an artificial navigable line of communication between the Firth of Forth and the Firth of Clyde.

From the Forth, at the port of Grangemouth, the navigation into the canal runs about a mile up the river carron from low-water mark in the firth to the first lock, where there are extensive harbor accommodations. Passing southwesterly through Grahamstown and the Carron Iron Works, the canal proceeds to Camelon and reaches Lock 16, where it attains an elevation of 128 feet above the level of tide mark at Grangemouth. At Lock 16 is the large basin called Port Downie, from which the canal sends off on its east side the Union Canal to Edinburgh, above mentioned. At Windford Lock, near Castlecary, it attains its highest elevation, and continues to preserve the same onward past Port Dundas at Glasgow, on the one hand, to the junction of the Monkland Canal, and onward on the other till near the aqueduct across Kelvin water. Thence it continues to the western terminus in the river Clyde at Bowling Bay, near the village of Bowling in Dumbartonshire, on the road from Dumbarton to Glasgow.

The work of excavation was begun in the year 1768, but on account of unforeseen difficulties, by reason of inexperience of its projectors in such schemes, the canal was not completed till 1790.

The Forth and Clyde Canal was incorporated with the Monkland Canal in the year 1846.

The extent of the Forth and Clyde Canal in all its parts is  $38\frac{3}{4}$  miles. The navigation direct from the Forth to the Clyde is 35 miles; the side branch to Port Dundas,  $2\frac{3}{4}$  miles; the continuation to Monkland Canal, 1 mile.

The number of locks on the eastern part of the canal is twenty, and on the western nineteen, the difference being occasioned by the higher level of water in the Clyde at Bowling Bay than in Grangeburn or the Carron at Grangemouth. Each lock is 74 feet long and 20 feet broad, and procures a rise of 8 feet.

The locks admit vessels of 68 feet keel, 19 feet beam, and  $8\frac{1}{2}$  feet draft of water.

The greatest altitude of the canal is 156 feet; its medium breadth at the surface, 56 feet, and its medium breadth at bottom, 27 feet.

The canal is crossed by thirty-three drawbridges and passes over ten large aqueducts and thirty small ones or tunnels.

The tonnage dues imposed were, from sea to sea,  $\frac{5}{8}$ s. 10d. (\$1.41); from Grangemouth to Port Dundas, 3s. 10d. (93 cents); from Bowling Bay to Port Dundas, 2s. (48 cents). Subsequently tonnage dues were greatly reduced, making the rate not more than  $1\frac{1}{2}$ d. (or 3 cents) per mile, but they continued to be remunerative.

In the year 1867 the two canals passed into the possession of the Caledonian Railway Company, and that company has ever since had the entire management of both of those systems of navigation.

#### THE MONKLAND CANAL.

This is an artificial navigable communication between the city of Glasgow and the district of Monkland, in the county of Lanark. Commencing in the northern suburbs of Glasgow, at Port Dundas, where it is brought into junction with the Glasgow branch of the Forth and Clyde Canal, it proceeds east southeastward through the parish of Old Monkland to the river North Calder. The canal sends off four branches—one, about a mile in length, to



Calder Iron Works, near Airdrie, in the parish of New Monkland; one, about a mile in length, to Gartsherrie Iron Works; one, about a quarter of a mile in length, to Dundivan Iron Works, and one, also about a quarter of a mile in length, to Langloan Iron Works, all in the parish of Old Monkland.

The canal originally was projected as a measure for securing to the inhabitants of Glasgow a constant and plentiful supply of coal. The corporation of the city adopted the project and, having employed the celebrated James Watt to make surveys of the ground, obtained an act of Parliament for carrying out the design and subscribed to a number of shares of the stock.

The width of the Monkland Canal at top is 35 feet, and at bottom 24 feet. Upon the lock sills the depth of water is  $5\frac{1}{2}$  feet.

By reason of the advantage possessed of easy communication with both the eastern and western seas, and because of its unlimited command of coal, the vicinity of the Monkland Canal has always been reckoned favorable for the establishment of manufactures, such as iron works and others of a like nature.

#### THE CALEDONIAN CANAL.

This is a navigable line of communication through the Great Glen of Scotland, which extends across the country directly southwest from the Moray Frith, between the mouth of the river Findhorn and two bold promontories called the Sutors of Cromarty; onward to the island of Lismore, dividing the county of Inverness and the Highlands generally into two nearly equal parts, while it connects the German Ocean and the Atlantic at those points.

The northeast end of the canal is occupied by about 23 miles of the narrow or upper portion of the Moray Frith; the southeast end is occupied to the extent of 32 miles by the sea lochs, Loch Eil and Loch Linnhe, and the intermediate portion has a total length of  $60\frac{1}{2}$  miles, of which  $37\frac{1}{2}$  consist of the four natural sheets of water named Loch Dochfour, Loch Ness, Loch Oich, and Loch Lochy. This intermediate portion is the region of the Caledonian Canal, which comprises works at its extremities and 23 miles of dry cutting.

It appears that by reason of the decay which has been rapidly going on in many parts of the original structure much of it has to be renewed and otherwise improved. In response to an application for assistance, the Government of Great Britain has sanctioned the sum of £5,000 (\$24,332.50) as a contribution toward liquidating debt already incurred by the commissioners of the Caledonian Canal, and it is hoped that Parliament will approve of further annual sums being devoted toward the renewal of the original structure, as suggested in the report made by the superintendent.

#### THE CRINAN CANAL.

This is a work at the north end of the peninsula of Cantire (otherwise Kintyre), in the county of Argyle, intended to afford a waterway between Loch Gilp and the Atlantic Ocean, in order to avoid the difficult and circuitous passage of 70 miles around the Mull of Cantire. The Crinan Canal is about 9 miles long, and contains fifteen locks, thirteen of which are 96 feet long, 24 feet wide, and 12 feet deep, and two locks are 108 feet long and 27 feet wide. Eight of the locks occur in the extent from Loch Gilp, or Ardrishaig, at the east end, and seven in descending to Crinan at the west

end. The canal is chiefly used by small coasting and fishing vessels and by the steamboats which ply between Inverness and the Clyde. It is navigable by vessels of 200 tons burden. The small passage steamers do the distance from one terminus to the other, including the locks, in about two hours.

It is expected that the Isthmus of Cantire at no distant date will be cut off from the mainland by the formation of a ship canal connecting East and West Lochs Tarbert. The cost of such an undertaking has been estimated at £140,000 (\$681,310).

From the foregoing description of the various lines of inland navigation at present in use in Scotland it will be noted that the three first mentioned, namely, the Union, the Forth and Clyde, and the Monkland, are all connected and worked as one system of water carriage, managed and controlled entirely by railway companies.

The Caledonian Canal and the Crinan are each quite independent of railways, but both are controlled and subsidized by the Government of Great Britain.

Therefore, in the first instance, there is no competition as to rate of cargo, and the latter independent systems have no competing lines of transit.

### CANALS IN CHINA.

[Report of United States Consul Anderson, Hangchau, China.]

There are several features of the canal system of China, especially of the Imperial or Grand Canal, which can be studied with profit by the people of the United States. One of these is the use of the canal for the production of food in addition to its uses as a means of transportation. Allied to this is the use of the muck which gathers at the bottom of the waterway for fertilization. Another is the use of every particle of plant life growing in and around the canal for various purposes.

The Chinese secure a vast quantity of food of one sort or another from their canals. To appreciate the exact situation with respect to the waterways, it must be realized that the canals of China cover the plain country with a network of water. Leading from the Grand Canal in each direction are smaller canals, and from these lead still smaller canals, until there is hardly a single tract of 40 acres which is not reached by some sort of a ditch, generally capable of carrying good-sized boats. The first reason for this great network is the needs of rice cultivation. During practically all of the growing season for rice the fields are flooded. Wherever a natural waterway can be made to irrigate the rice fields it is used, but, of course, from these to the canals or larger rivers there must be waterways. Where natural streams can not thus be adapted the Chinese lead water in canals or ditches to the edge of their fields and raise it to the fields of rice by the foot-power carriers which have been described so often by tourist writers. However the water is supplied to the rice, it is evident that there must be a waterway leading to the field and back to a principal stream, which is generally a branch canal. These waterways naturally take up a considerable portion of the land, and the Chinese make as profitable use of them as of the land itself.

The first use of the waterways is for fishing. The quantity of fish taken from the canals of China annually is immense. The Chinese have no artificial

fish hatcheries, but the supply of fish is maintained at a high point by the fact that the flooded rice fields act as hatcheries and as hiding places for the young fish until they are large enough to look out for themselves. In the United States this fish propagation annex to the canals is probably neither possible nor needful in view of the work done by the State and National bureaus, but in China it is nothing less than providential.

Along the canals in China at any time may be found boatmen gathering muck from the bottom of the canal. This muck is taken in much the same manner that oysters are taken by hand on the Atlantic coast. In place of tongs are large bag-like devices on crossed bamboo poles which take in a large quantity of the ooze at once. This is emptied into the boat, and the process is repeated until the boatman has a load, when he will proceed to some neighboring farm and empty the muck, either directly on the fields—especially around the mulberry trees, which are raised for the silkworms—or in a pool, where it is taken later to the fields. From this muck the Chinese farmer will generally secure enough shellfish to pay him for his work, and the fertilizer is clear gain. The fertilizer thus secured is valuable. It is rich in nitrogen and potash and has abundant humus elements. This dredging of the canals for fertilizers is the only way by which the Chinese have kept their canals in reasonably good condition for centuries. The fertilizer has paid for itself both ways. Recently there were complaints filed at Peking that the ashes from the steam launches plying on the canal were injuring the muck for fertilizing purposes, and the problem has been considered a serious one by the Chinese Government.

In addition to securing fertilizers from the canals, and thus keeping the canals in condition, the farmers help keep them purified by gathering all floating weeds, grass, and other vegetable débris that they can find upon them. Boatmen will secure great loads of water plants and grass by skimming the surface of the canal. The reeds growing along the canals are used for weaving baskets of several grades, and for fuel. In short, no plant life about the canal goes to waste.

Where there are so many canals there is more or less swamp ground. In China this is utilized for the raising of lotus roots, from which commercial arrowroot is largely obtained. There is no reason why much of the waste swamp land in the southern portion of the United States should not be used for a similar purpose, and the commercial returns from a venture of this sort in that part of the country ought to be satisfactory. Where the canals of China widen, by reason of natural waterways or for other reasons, the expanse of water not needed for actual navigation is made use of in the raising of water nuts of several varieties, especially what are known as water chestnuts. These nuts are raised in immense quantities. They are, strictly speaking, bulbs rather than nuts. They are rich in arrowroot and are prolific, an acre of shallow water producing far more than an acre of well-cultivated soil planted in ordinary grain or similar crops. These nuts, also, could be produced to advantage in the United States where there is land inundated for the growing season to a depth which will give ordinary water plants a chance to thrive and which is not capable of being drained for the time being. The nuts or bulbs are toothsome when roasted, and are wholesome, but probably would be more valuable in the United States for the manufactured products which can be secured from them.

There are duck farms all along the canals in China. These are profitable. Chinese canals, as a rule, considering the population upon them and their varied uses, are cleaner than canals in the United States. There are few if any factories to contaminate them. The Chinese use of certain sewage for fertilization also prevents contamination to a great extent. The canal water is used for laundry, bath, and culinary purposes indiscriminately. A canal in the United States could never be what it is in China, but the Chinese have a number of clever devices and ideas in connection with canals which can be adopted in the United States with profit.

The Grand Canal system in China has existed in almost its present shape since about the time Columbus discovered America. The Grand Canal itself, extending from Hangchow to Peking, is about a thousand miles long. Much of it is banked with stone, and all of it is in such condition that with the expenditure of a little money the system could be put upon a modern and effective basis. As it is, the canal handles practically all the internal trade of China, and this trade is far greater than its foreign trade. The coming of railroads will affect the canals somewhat, but not so much as may be imagined, for the railroads will very largely build up a trade of their own. A little money will make China's canal system in the future what it has been in the past, the greatest on earth.



# INDEX.

(Volumes I and II)

Part Three—Bibliography—not indexed, except headings. See special table of contents, p. 1175, for synopsis of bibliography.

- Abandoned canal lands (Erie)**, near Champlain, 960; at Geddes, 961; at Port Byron, 962; at Rochester, 963; nuisance, Clyde, 963; nuisance, Little Falls, 969; Fairport, bank removal, 972; sale, law (1905), 979; (Chemung), map and report (1892-3), 998; (Chenango), damages, town of Madison, 1004.
- Abandonment of lateral canals**, *see* Lateral canals.
- Adams, Campbell W.**, criticised, nine million improvement, defense (1898), 375; biography, 1146.
- Advisory board**, consulted by state engineer (1900), 384.
- Advisory board of consulting engineers**, authorized, Barge canal act (1903), 396.
- Aire and Calder canal**, history, 1497.
- Alabama canals**, history, 1413, 1434; statistics, 1473, 1475.
- Albany**, completion ceremonies (1823), 113, 958; New Baltimore canal (1853), 208; bridges: Water st., 960, 972; over Hudson, height, 1021; Ferry st., 964, 970; Exchange st., 1021; over Hudson, State st.-Maiden lane, 1022; Lawrence st., 968; N. Erie st., 970; lock 1, lengthening considered, 366; lumber district, improvements suggested, revised estimates (1903), 394.
- Albany and Bath-on-the-Hudson Bridge Co.**, incorporated, 1023.
- Albany and Greenbush Bridge Co.**, incorporated, 1022.
- Albany and New Baltimore canal**, proposed (1804), 1019; further reports (1820, 1823, 1834, 1835), 1020, 1021.
- Albany and New Baltimore Ship Canal and Basin Co.**, chartered (1853), 208, 760, 1020.
- Albany basin**, authorized (1823), 112, 958, 1020; Albany to improve (1835), 1020; acquirement by State (1849), 961; narrowing, 965; repairs (1869), 966, 1022; not canal but State property, decision, 345; improvement (1836-7), 1020; (1866), 1021; (1867), 965; (1893), 972; bibliography, 1260.
- Albemarle and Chesapeake canal**, history, 1396; statistics, 1470.
- Albion bridge**, Ingersoll st., 961; fatal bridge accident, 963.
- Alexandria and Georgetown Canal**, statistics, 1470.
- Aldridge, George W.**, criticised, nine million improvement (1898), 375; suspended from office by Governor Black (1898), 378, 976.
- Allegany River Slack-water Navigation Co.**, incorporated (1857), 760.
- Allegany Slack-water Navigation Co.**, incorporated (1839), 760.
- Allegheny river**, canalization, history, 1427; statistics, 1474; bibliography, 1267.
- Allen, Joseph D.**, Chemung canal extension, surveys, lock examination, report (1839-40), 624, 753, 995; Chenango canal extension, survey, report (1838-9), 696, 1014.
- Amoskeag Falls canal**, statistics, 1465.
- Amherst bridge**, 964.
- Amsden**, hydrostatic scale, 275, 965.
- Amsterdam bridge**, Bridge st., 972; dyke, repairs, 974.
- Andrus, Daniel H.**, biography, 1146.
- Appraisers**, *see* Canal appraisers.
- Aqueducts**, tables, Erie canal, 1069; Champlain canal, 1112; Oswego canal, 1123.
- See also* names of localities.
- Arkansas canals**, histories, 1435, 1437; statistics, 1475.
- Arnoldt, George**, biography, 1146.
- Assistant Superintendents of Public Works**, tabular list (1878-1905), 1139.
- Attorneys-General**, tabular list (1817-1905), 1134.
- Auburn and Owasco Canal Co.**, incorporated (1828), 760.
- Auburn and Owasco Canal Co.**, incorporated (1832), 760.
- Auburn Canal and R. R. Co.**, incorporated (1832), 760.

- Auditor**, *see* Canal auditor.
- Augusta canal**, history, 1398; statistics, 1471.
- Averill, Henry K.**, biography, 1147.
- Baerman, Palmer H.**, biography, 1147.
- Bagg, Egbert**, biography, 1147.
- Baldwin, Jonas C.**, builds private dam, canal and lock at Baldwinsville (1807-8), 564; title transferred (1819), 565, 1015.
- Baldwinsville canal**, construction (1807-8), tolls authorized (1809), 564, 1015; complaints, examination, Geddes' report, defects (1817-18), 565, 1015; charter extended (1827), maintenance optional with canal board, 565, 1015; ordered repaired and maintained (1831), 566; lock rebuilding (1831), 566, 1015; connected with system, Seneca river towing-path (1836-9), 566, 1015; extension private privilege denied (1849), State assumes control (1850), navigation extended to Jack's reef, 567, 1015; monuments at dam, 1015; placed under canal regulations (1854), declared not part of system (1862), 567, 1016; lock rebuilding, 568, 1016; canal bridge, 1016; float-bridge, 1016; Baldwinville dam, rebuilding agitated, 568, 1016; dam rebuilt of stone (1893-4), 568, 1016; annual tonnage (1854-1856), 1062; annual tolls (1853-1863), 1066; cost and revenues, summary (1882), 1068; statistical tables, 1036, 1466; bibliography, 1243.
- Baker's falls**, dam damaged, 417, 979.
- Banknight's canal**, history, 1398; statistics, 1471.
- Barge canal**, trend of events, 343; Schenck, first presentation (1892), 345; again urged (1894), 349; inception, Greene committee appointed (1899), 380, 976; Greene committee report, plans and finances (1900), 383, 977; survey ordered, 384, 977; report of 1901, routes and estimates, 386, 978; movement gains strength, revised estimates (1903), 393, 978; act passed (1903), dimensions, routes, 395, 978; cross-sectional diagrams (1903), 1052; act ratified (1903), 398, 978; use of concrete, advantages, special report (1904), 400; surveys, test contracts, lump-sum bids, first work, 402, 978, 979; Black River canal, retained as navigable feeder (1905), 563; change in lock width (1905), 403, 979; Oneida river utilized (1905), 570, 575; route absorbs Baldwinsville canal and Seneca river towing-path (1905), 568; Cayuga lake, proposed changes (1905), 406; (Champlain route), route established (1903), 441, 987; first construction work (1905), 442, 987; (Oswego route), surveys, act of 1903, progress, 471, 991; bibliography, 1231.
- Barnes, James**, biography, 1147.
- Barnes, Wheeler**, advocates Tibbitts' plan (1817), 82.
- Barren river**, *see* Green and Barren rivers.
- Barrett, Alfred**, biography, 1148.
- Barrett, Alfred W., Jr.**, biography, 1148.
- Barrow navigation**, history, 1504.
- Bartow, Andrew A.**, biography, 1148.
- Bascom, Oliver**, death, 866.
- Bates, David S.**, Chenango canal survey (1829), 1002; biography, 1148.
- Bayou Lafourche**, canalization, history, 1439.
- Beach, Chas. A.**, biography, 1148.
- Beach, Chas. H.**, biography, 1149.
- Beach, Henry T.**, biography, 1149.
- Beach, Nelson J.**, biography, 1149.
- Beauharnois canal**, history, 1442, 1456; statistics, 1476.
- Beaver canal**, history, 1382; statistics, 1468.
- Beaver river**, bridge over, 1008; building towing-path, 1008.  
*See also* Black River canal.
- Behn, J. Frederick**, biography, 1149.
- Belgian canals**, histories, 1492.
- Bellows Falls canal**, statistics, 1465.
- Bench marks**, bibliography, 1352.
- Bench walls**, *see* Canal policy.
- Bibliography**, New York Canals, 1173.
- Big Sandy river**, canalization, history, 1430; statistics, 1475.
- Binghamton**, bridges: 1002, 1003; Henry, Hawley sts., 1003; Court st., 1003.
- Binghamton, Owego and Pennsylvania Slack-water Navigation Co.**, incorporated (1855), 760.
- Birmingham and Liverpool canal**, history, 1500.
- Biggood, John**, death, 974; biography, 1149.
- Black, Frank**, appoints investigation commission, New York Commerce Commission (1898), 374, 975, 976; suspends Superintendent (George W. Aldridge) (1898), 378, 976.
- Black River canal**, petitions, advantages urged, surveys (1825), 506-7, 1005; alternative routes, Remsen,

Camden, Boonville, details, estimates, 508-9; Black River Canal Co., surveys, plans, inclined planes (1828), 512-13, 1005; renewed petitions, inclined planes urged (1829), 514; legislative consideration, referred to canal commissioners, new survey ordered (1829), 515, 1005; again referred (1830), Holmes Hutchinson's report (1831), 515, 1005; estimates, inclined planes considered, 518-23; renewed efforts, petitions (1831), 524; subject again agitated, examination, survey and estimates ordered (1834), 526, 1005; Jervis survey, report, estimates (1835), 526-8, 1005; canal commissioners advise another survey, 528; further efforts, measure defeated (1835), construction authorized (1836), 529, 1005; engineers' adverse report on inclined planes, 531; proposed Black river diversion, opposition (1837), 532; final report, estimates, construction begun (1837), 532-4, 1005; Delta side-cut urged, 434-5; extensions urged (1838-9), surveys ordered (1839), 537, 1005; extension surveys, report, routes and estimates, measure defeated (1840), 537-8; progress of construction (1839-40), quarries developed, 539-40, 1005; Erie canal, Rome level, scarcity of water, value of Black River feeder, 540, 1006; "stop law" of 1842, its effect, 540, 1006; sale of materials ordered, 541, 1006; made "constitutional" (1846), 178, 1006; constitution of 1846, surplus revenues for completion, 179, 541; work on locks and feeder resumed (1847), 542, 1006; opening feeder (1848-9), Black river exhausted, reservoirs planned, 542-3, 1006; Rome-Boonville section filled (1849), opened (1850), first boats passed, 544, 1006; "the big letting" (1851), 199; Delta feeder begun (1851), 544, 1006; completed (1860), 1007; work again stopped (1852), 202; revised estimates (1854), 214; river section, alternative plans, dredging adopted (1854), 547; canal completed to Lyons Falls (1855), opened (1856), 546, 1006; repair contracts, 1006; river section, plans changed, slack-water navigation adopted (1857-61), 547, 1007; flood damages (1861), 1007; pier built, Otter creek, 1007; river section, further improvement (1864-9), 548, 1007, 1008; enlargement, Rome

level (1867-70), 548, 1007, 1008; retained as "constitutional" (1873), 286; (1882), 550, 1008; canal board and special commission to consider abandonment, report, 549, 1008; abandonment agitated, retained as navigable feeder (1877), 548-50, 1008; abandonment agitation, study of causes, 763-85; changed from eastern to middle division (1876), 550, 1008; Beaver river reservoir, built (1881-94), 551, 1008, 1009; new dam built (1900-3), 560, 1010; water diversion, continued complaints, Forestport dam, water-supply (1884-8), 552; Forestport reservoir built (1883-93), 551, 1008, 1009; flood damages (1884), 1008; dam, Delta, injured (1886), 1009; rebuilding locks (1887-1900), 560, 1009, 1010; Forestport reservoir, railroad embankment, controversy (1894-1904), 553, 1009, 1010; water-supply, excerpts from report (1898), 554-60; Forestport feeder, malicious breaks (1897-8-9), 385, 561, 975-6-7, 1009-10; criminals punished (1900), 562; section 2, above Boonville, officials urge abandonment (1900-5), 562-3, 1010; Forestport pond, dam rebuilt (1902-3), 396, 560, 1010; break (1903), lock No. 13, 1010; cross-sectional diagrams, 1059; annual tonnage (1851-1905), 1062; annual tolls (1850-1882), 1066; cost and revenues, summary (1882), 1068; statistical tables, 1035, 1466; bibliography, 1241, 1361.

**Black River Canal Co.**, petitions, incorporations (1828), 510-11, 760, 1005; surveys, estimates, plans, 512, 1005; franchise offered to State (1829), 514; charter expires (1831), 525.

**Black River Co.**, incorporated, provisions of charter (1832), 525, 760, 1005.

**Black river, La.**, *see* Ouachita and Black rivers.

**Black River Navigation Co.**, incorporated (1810), 760, 1005.

**Black Rock**, contest with Buffalo (1822), 110; independent canal authorized (1825), 122, 958; pier built (1828), 959; pier damaged (1837), 959; new pier (1838), 959; investigation (1846), 181; obstructions removed (1848), 961; widening channel (1870), 279.

**Black Rock harbor**, improvement, history, 300; improvement (1822), 109, 957; (1866), 965; damages (1844), 960; (1856), 962; swing-



- bridge, 964; crib ordered (1871), 967; wall, 968; bibliography, 1257.
- Black Rock Harbor Co.**, experiment pier (1822), 110; destroyed (1826), 111, 958.
- Blackstone canal**, history, 1372; statistics, 1465.
- Black Warrior river**, canalization, history, 1434; statistics, 1475.
- Board of claims**, tabular list of members (1883-1897), 1138.
- Bogardus, Ova H.**, biography, 1150.
- Bogart, John**, biography, 1150.
- Bond, Edward A.**, status, nine million improvement, report (1899), 379; Greene committee (1899), 380; submits Barge canal report (1901), 386; advises use of concrete in canal work (1902), 393; revised Barge canal estimates (1903), 393; biography, 1150.
- Bouckville**, bridge, 1003.
- Bouck, Wm. C.**, approves "stop law," 170.
- Bows Falls canal**, statistics, 1465.
- Bradley's creek**, wall built, 465, 990.
- Breaks**, *see* names of canals.
- Brevoort, B. H.**, biography, 1151.
- Bridges**, *see* Canal bridges; *also* names of localities.
- Brighton**, bridge, 975, 977.
- British canals**, histories, 1480, 1497.
- Broadhead, Charles C.**, eastern division (1816), 76, 788; biography, 1151.
- Brockport**, bridges: Perry st., 965; Main st., 968-70.
- Broadhead, Edward H.**, Black River extensions, surveys (1839), 537, 1005.
- Brooks, Melvin M.**, biography, 1151.
- Brown, Hurlburt E.**, biography, 1151.
- Brunswick and Altamaha canal**, statistics, 1471.
- Brutus**, bridge, 972.
- Buffalo**, made canal terminus (1822-3), 110, 588; bridges, Washington and Michigan sts., 960; sea walls, 960; bridges: Genesee st., 961; Hospital st., 961; Hamilton st., 962; pier and breakwater, Federal aid asked (1859), 249; bridges: Austin st., 967, 970; York st., 968; bank protection, Jersey st., Hudson st., 969; sewer to relieve canal, completed, 970; bridges: Hudson st., 970; Canal, Prime, Scott, Perry sts., 972; canal prism, obstructions, 343, 972; canal improvements (1893), 346; (1894), 350, 973; bridges: Mill st., 973; Porter ave., 974, 975; Hamilton st., 975, 976; Erie st., 975, 977.
- Buffalo creek harbor**, survey (1818), 90, 957; appropriation (1819), 92, 957; improvement (1822), 109, 957.
- Buffalo slips**, early need of harbor (1817-19), 588; traffic congested, delays, growth of slip system, 589; Main and Hamburg canal: commenced by city, transfer to State (1838-40), 590; delays, completion (1851), 592; sewage problem, remedial expedients, abandonment (1894), conveyed to city (1898), 601-2; Clark and Skinner canal: early history, transfer to State (1863), 592-3; abandoned (1901), 604; Erie basin, slips Nos. 1, 2 and 3: authorized, construction begun (1849), defective title, 594; remedial legislation (1849), partial completion (1851), 595; Erie basin, pier and breakwater: contract abandoned (1857), relet, 596; Federal aid asked (1859), 249; Ohio slip and basin: construction begun (1849), completion (1850-1), 598; abandoned (1901), 603; Evans ship canal, begun (1832), completion (1834), 598; Commercial, Prime and Coit slips, 598-9; City ship canal, projection (1836), construction (1850), extension (1883), 599-600; later history, sewage problem, remedial expedients, 600; present condition, 605; bibliography, 1257.
- Burlington canal**, history, 1463.
- Burrus, Charles D.**, biography, 1151.
- Butternut creek**, Jamesville reservoir begun (1872), 967; completed (1874), 967.
- Caledonian canal**, history, 1508.
- Calhoun, John C.**, improvement plan (1817), 80.
- Canadian canals**, histories, 1441; statistics, 1450, 1476.  
*See also* Canals, Canadian, and names of provinces or canals.
- Canajoharie**, bridges, 350, 973, 974, 975, 976, 978.
- Canal appraisers**, appointed (1825), 958; (1836), 959; tabular list (1825-1882), 1138; duties defined, 958; number fixed, 962; office abolished (1883), 319, 969.
- Canal auditor**, office created (1848), 100, 961; tabular list (1848-1882), 1137; additional duties (1859), 963; annual legislative report required, 963; office abolished (1883), 319, 969.
- Canal board**, created (1826), 958; power of investigation, 302, 963;

- power to terminate improvement contracts (1899), 380, 976-7; tabular list of members (1826-1905), 1132.
- Canal-boats**, number (Champlain) in 1821 and 1823, 980; increased dimensions, crowding the waterway, 246; capacity increased (1857), 236; number (1825), 958; (1849), 961; (1869), 277; (1876), 304; (1890), 336; (1897), 371; ice-bound (1858), 963; weighing, Amsden's scale (1868), 375; Reim's scale, 278; Reim's Champion scales, 283; dimensions again crowding locks (1873), 288; steamers, number (1874), 967; (1878), 308, 968; (1891), 972; speed, dynamometrical tests, 305, 968; registry transferred (1887), 970; new (1888), 970; increased dimensions (1888), 332; liens, filing (1892), 344, 347; (1897), 370; liens, amendment (1894), 351; steel boats (1895), 358, 365; steel fleet withdrawn (1901), 390; bibliography, 1334, 1366.
- Canal bridges**, canal board resolution, 965; number in 1866, 985; number maintained without State benefit (1880), 969; iron, let by contract on specifications, 969; restrictive act, 340, 971; on roads opened after canal-building, report, 971; appropriation (1892), report, 972; movable *vs.* fixed, European types, Rafter's report (1895), 361; tables, Erie canal, 1071; Champlain canal, 1113; Oswego canal, 1124; bibliography of plans, 1364.
- See also* names of localities.
- Canal commissioners**, office created (1817), 86; as appraisers (1821), 957; salary (1823), 958; Clinton's removal, 118, 958; adopt changed plans (1848), 188, 961; office abolished (1876), 302, 968; tabular list (1810-1878), 1130.
- Canal companies incorporated** (New York), tabular list, 760.
- Canal fund**, commissioners of, board created (1817), 85; sources revenue (1817), 86; tabular list (1817-1905), 1134.
- Canal lands**, bibliography, 1333.
- Canal-locks**, introduction, 5; early Flemish, 5; (Barge canal), change in width (1905), 403, 979; (Black River), inclined planes preferred, description (1828), 513; all locks repaired (1877), 1008; rebuilding (1887-1900), 560, 1009, 1010; (Cayuga and Seneca), stone locks authorized (1836), 481, 992; enlarged composite locks authorized (1847), 488, 992; survey, estimates, construction (1848), 489, 992; progress, enlargement (1849-55), 489, 491, 993; Seneca Falls side lock, rebuilt (1851), 491, 993; enlargement, composite locks, disadvantages, 495; rebuilding (1867-70), 495, 993, 994; (Champlain), guard-lock, Mohawk river, rebuilt, 420, 980; new lock, Wood creek dam (1837), 422, 981; Glens Falls feeder, rebuilt of stone (1837-9), 421, 981; Bassett's rebuilt, 981; Flynn, Moses Kill, rebuilt, 422, 981; feeder guard-lock rebuilt, 426, 981; Becker's lock rebuilt, 426, 981; Whitehall, changes of plans (1850-53), 427, 981, 982; No. 7 (Waterford) rebuilt, 427, 982; constitutional amendment (1854), enlarged locks, 428, 982; progress (1854-77), second lock enlargement, 982-4; weigh-lock (Waterford) completed, 432, 982; survey, enlargement (1866), report (1867), 434, 983, 1021; Cohoes guard-lock rebuilt, 984; Nos. 6 and 7 rebuilt, 986; (Chemung), defective design, remedy (1832), 616; rebuilding authorized (1840-41), 625, 995; 53 rebuilt locks completed (1842), 996; condition (1850), defects, remedy, 629; temporary repairs (1850-56), 630; gradual rebuilding (1856-67), 631, 966, 967; enlargement issue revived, estimates, compromise measure (1858), 633, 996; enlargement directed (1864), 635, 996; (Chenango), rebuilding begun (1861-2), 688, 1003; progress (1861-72), 689, 691, 1003; locks closed at night (1865), 690, 1003; stone given for monument to Gen. Herkimer, 1004; (Crooked Lake), reconstruction authorized (1845), 648, 999; locks rebuilt (1846-50), 648, 649, 999; reconstruction continued (1865-72), 650, 999, 1000; (Erie), hydrostatic, Utica, Syracuse, 116, 958; described, 117; double system inaugurated, 132, 959; weigh-locks, Utica, West Troy, Syracuse, 132, 959, 960; double system advised (1834), 133; doubling authorized, Albany to Syracuse (1834), 135, 959; proposed changes, Cohoes (1836), 149; estimates to complete (1846), 177; revised estimates (1847), 180; proposed changes, Syracuse to Roches-

ter (1848), 186; change of plans (1848), 188; the "big bevel" (1848), 189, 961; temporary enlargement, Syracuse to Rochester (1849), 961; (1851), 196; Port Byron to Rochester (1852), 202; Seeley's apparatus, 221, 962; further lengthening considered (1859), 245; "big bevels" removed (1860), 251, 963; auxiliary power suggested (1861), 254; further lengthening inexpedient, 255; estimates for national defense (1862), 262, 964; "Gunboat" project, S. S. Ruggles, commissioner to Congress, 964; "Gunboat" survey (1863), 262, 267, 964; concrete foundations used, 264; appropriation, West Troy, 264, 964, 965; No. 2 rebuilt, 964, 966; Heath tumble-gate introduced (1865), 265, 964; (1870), 280, 283, 967; use favored, 317; enlargement urged (1867), 268; doubling, western division, 966; widening, Nos. 39, 47, 48 and 49, 966, 967; enlargement plan defeated (1871), 283, 966; additional widening advised (1873), 288; Nos. 57, 58, 59 and 72 doubled, 967; entirely doubled (1874-5), 292, 967; Richmond's turbine device, 969; lengthening inexpedient (1878), 304; auxiliary power mechanism tested (1880), 312; lengthening first attempted, 319; first lengthening (1884), 326-7, 969, 970; lengthening twenty-one locks authorized (1886-7), 328, 970; additional numbers authorized (1888), 330, 970; (1889), 332, 970, 971; Nos. 47, 48, 49, 51, 52, lengthened, 970; improved appliances, paddle valves (1888), 334; Nos. 31, 32, 33, 34, 35, 44, 45, 53, 54, 55, 56, 60, 61, 62, 72, lengthened, 970; No. 46, lengthening stopped, 330, 970; lengthening policy continued (1890-91), 337, 971; Nos. 27, 28, 29, 30, 63, 64, lengthened, 971; Nos. 23, 24, 25, 26, 65, 66, lengthened, 337, 971; Nos. 40, 41, 42, 43, 46, lengthened, 339, 972; lengthening suspended (1891-2), difficulties at Utica, 339; lengthening stopped, lack of appropriations (1892), 342; No. 19, lengthened, 973; No. 20, lengthening, 349, 973, 974; Nos. 21, 22, improvement, 356, 973; elevator lifts (1895), 359; petty extortions at, correction (1895), 360; lengthening 21, 22, at Newark, Albany, Cohoes, Little Falls, Lockport, mechanical lifts, 366; Cohoes, pneu-

matic lock authorized (1899), 380, 976, 986; difficulties of early construction, use of hydraulic cement, 797; proposed enlargement (1902), 391; (*Genesee Valley*), plans changed (1839), 713, 1011; materials, 722; (*Junction, Champlain*), hydrostatic, 980; (*Oneida Lake*), enlargement estimates (1862), reconstruction begun (1863), 662, 1001; stopped, new route discussed (1863), 663, 1001; (*Oswego*), Mud lock rebuilt (1836), 453, 988; enlarged (1887), 467; enlargements, restrictions (1847), 457, 988; loan of 1851, 209, 459, 988; enlargements (1851), 459, 998; estimates (1854), 214; *Oswego weigh-lock* (1863), 462, 989; (*tables*), *Erie canal*, 1105; *Champlain canal*, 1120; *Oswego canal*, 1128; bibliography, 1335, 1364.

**Canal officials**, bribing, misdemeanor, 968; offices of auditor, weighmaster, collector, appraiser, abolished (1883), 319, 969; lists of officials (1810-1905), 1130.

**Canal policy**, commissioners to borrow money (1812), 956; power to borrow money revoked (1814), 957; party issue (1817), 81; Clinton's removal, 118, 958; Federal tonnage dues, 120; Clinton's re-election (1824), 120; authorization of laterals (1825), 131; identical with State finances (1834-62), 137; Gov. Marcy's views, 137; lack of financial plan, 138; advent of railroads, relative cost (1835), 142; proposed Ontario-Hudson ship canal (1835), 143; \$4,000,000 loan (1838), 155; restriction, official powers, 157; financial conditions retard progress (1839), 160; retrenchment (1840-1), 163; financial stringency increases (1841), 164; *Niagara ship canal* urged, 164; Seward's retardation plan (1841), 165; State debt referendum (1841), 166; financial crisis (1842), 168; "stop law" passed, taxes resumed (1842), 169, 960; railroad tolls reviewed, encroachments (1844), 174; *Erie and Oswego routes*, competition, 458; Gov. Young's review (1848), 183; Comptroller Flagg's review (1848), 185; revenue certificate plan (1851), 192, 961; loan plan, amendment plan (1851), 193, 961; "nine million act" (1851), 193, 961; railroad tolls abolished (1851), 195, 961; results of act of 1851, 196; certificates de-

clared unconstitutional (1852), 202, 961; Gov. Seymour's views (1853), 203; commissioners favor constitutional amendment (1853), 204; contract repair system advocated (1853), 205; anticipatory expenditures censured (1853), 206; "modified" plan recommended (1853), 206; railroad competition feared (1853), 207; deficiency tax advised (1853), 208; special session, constitutional amendment (1853), 210; Niagara project opposed (1853), 212; commissioners' overdrafts, minor frauds (1853), 213; constitutional amendment (1854), 214, 962; contract repair system tested, authorized (1854), 215, 962; five-year contracts let (1854-5), 982, 996, 999, 1012; certificate plan repealed, enlargement, temporary completion authorized, 215; first loan under amendment (1854), 217; conflicting opinions, agitation (1855), 219; second constitutional loan (1855), 219; efforts to reimpose railroad tolls (1855), 220; contract repair system extended (1855), 223; proposed change of control, sale (1856), 224; underestimates criticised (1856), 225; third constitutional loan (1856), 226; estimates insufficient, 227; appropriations exhausted, work restricted, 228, 962; views, State Engineer (1857), 230; auditor's analysis (1856), 231; argument for railroad tolls, 232; direct tax resumed, \$500,000 loan (1857), 235; railroad tolls again urged (1858), 237; the "price" of enlargement, 239; power of railroads, 239; estimates again increased (1858), 240; again revised (1859), 244; railroad tolls, further efforts to impose (1859), 246; treasury empty, deficiency loan (1859), 246; restricting official extravagance (1859), 247; contract system in full force (1859), 248; better facilities demanded, removal of "big bevels" (1860), 251, 963; enlargement approaching completion (1861), 253; war overshadows local issues (1861), 254; war blockades, tolls largely increased (1861), 256; enlargement declared completed (1862), 257; Federal canals authorized (1862), 257; provisions of "completion law," 258; contract repair system, unsatisfactory, 260; influence of Civil War, 260; war measures pro-

posed, estimates, 261, 463; wall benches, removal begun (1863), 263; Erie-Ontario Federal project denounced (1865), 267; lock enlargements urged (1867), 267; contract system condemned, abuses exposed (1868), 268; sweeping administrative changes proposed (1867), 271; delays, relief suggested, time of lockage, tests (1867), 272; maintenance by engineers advocated (1867), 273; debt of 1846 paid, results (1868), 274; contracting board and contract system abolished (1870), 278, 966; benches remaining, abolition contract repair system, results (1870), 281; increased speed, power propulsion commission (1871), 282, 966; lock enlargement defeated (1871), 283, 966; criticism, investigation requested (1872), 284; abolition of commissioners proposed, "constitutional" canals, proposed reduction (1873), 286; division of responsibility explained, 288; legislation affecting (1874), 290; Tilden's views (1875), 292, 968; excessive terminal charges (1875), 294; legislative recommendations, unbalanced bids, continued contracts (1875), 296, 968; financial troubles, 300; Tilden's recommendations (1876), 301, 968; Erie, Oswego, deepening, 302, 968; disposition of laterals, commission appointed (1876), 302; abandonment and sale of certain laterals, law (1877), 968; Tilden's reforms, beneficial results, 303; Canadian canals threaten American commerce, "Seymour plan" (1878), 309; trade conditions (1879), 311; terminal charges, extortions (1880), 313; low tolls, low rates, low revenues (1881), 314; abolition of tolls (1882), 316, 969; retrenchment (1883), 316; railroad encroachments within "blue line," 318; conflicting opinions, 320; prominence of subject, 322; engineers discuss (1884), 323; lock-lengthening (1886-7), 328, 970; deepening the Erie, "bottoming out" (1887-8), 330, 332; Utica sewer vetoed (1889), 334; lock-lengthening and bottoming out (1890), 337; lock-lengthening suspended, no appropriations (1891), 339; cost of bridges, restrictive act (1891), 340, 971; constitutional convention authorized (1892), 342; deepening to nine feet, radical change of plan demanded (1893),

- 343; increased speed, electric power, waste water plan (1893), 344; extensive improvements urged (1894), 348; "Seymour plan," modification, nine-foot plan (1894), canal laws codified, 349; popular demand for improvement (1894), 350; trend of events toward improvement (1895), 354; nine million bond issue, 355, 973; nine million act, ratification, bond sale, act construed (1895), 362, 974; appropriations, apportionment to divisions (1896), 364, 974; blanket appropriations, results satisfactory, "nine million" act construed, 367; State operation of canals proposed (1897), 370; terminal charges, necessity of restricting (1897), 372; insufficient estimates acknowledged (1898), 373; New York Commerce Commission of 1898, improvement work stopped, 374; estimates, expenditures, public criticism (1898), 375; Roosevelt statement, 376; board empowered to settle contracts, appointment of new committee, inception of Barge canal project (1899), 380; railroad differential rates, terminal charges (1900), 382; Greene committee, report, plans and finances (1900), 382, 977; Barge canal survey ordered, 384, 977; general discussion by engineers (1900), Barge canal report of 1901, 386; differences of opinion defeat legislation, 388; navigation laws, restrictions removed, 389, 978; Governor Odell's propositions, enlarged locks, nine feet depth (1902), 391; \$82,000,000 plan, obstructive measures (1903), 393; \$101,000,000 Barge canal act (1903), provisions, routes, 395; Federal aid urged (1905), 401; old claims barred, increase of pleasure craft, proposed fees (1905), 405; bibliography (management), 1277; (contracts), 1283; (claims), 1286; (finances), 1288; (investigations), 1301.
- Canal scales**, Amsden's hydrostatic, 275, 965; Reim's "champion" (1870), 278; recommended, 283; bibliography, 1335.
- Canals, Canadian**, first canal, 7; Chambly route (1849), 191; improvements threaten American commerce (1878), 309-12.  
*See also* Canadian canals and names of canals.
- Canals, foreign**, ancient canals, 4; English builders, 6; early French, 6.  
*See also* names of canals.
- Canals, New York**, first canal, 7; Jefferson's adverse view, 9, 81; Madison's, opposition, 9, 81; chronological periods, 10; legislative plan (1791), 29, 955; first canal law (1791), 29, 955; early difficulties, 49; war delays (1812), 71; N. Y. memorial, 73; Tibbitt's financial plan, 82; construction begun (1817), 86, 957; tolls authorized (1820), 98; regulations (1820), 98, 957; speed of boats regulated, 106, 957, 960; Clinton's removal, 118, 958; Federal tonnage dues, 120; great canal law (1825), 131, 958; maps authorized (1827), 958, 980, 987, 992; offer to complete (1841), 170, 960; constitution (1846), financing the canals, 179; contract repair system favored (1847), 180; resumption of work (1847), 181, 960; enlargement of laterals, status (1850), 192, 961; revised estimates (1851), "big letting," 197; contract repair system, general introduction (1855), 223; Navigation regulations amended, penalties (1859), 963; ascertainment of obstructions, 963; regulations (1861), 963; penalties, fast driving on bridges, 964; removal of encroachments, 964, 965; flood damages (1865), 964; (1869), 966; removing impediments to navigation, 966; destroying boats, declared felony, 966; maintenance, Hughes' dredge, 966; certain canals made "constitutional" (1874), 967; laterals, maintenance, expenditures restricted (1875), 967; sale of laterals, canal board to report, 967; appropriations repealed (1876), 968; "bottoming out" (1882), 969; financial status (1882), 969; canal ice regulations, cutting, 969; selling, 336, 971; penalties, animals on tow-path, 971; regulations, floating elevators, 365, 974; power to remove encroachments, 974; International Deep Waterways Association (1895), 357; Deep Waterways, engineers report, 370; damages, law (1899), 976; abating nuisance, escaping water, 977; street railway crossings, law (1902), 978; cross-sectional diagrams, 1037-59; abandonment of laterals, study of causes, 763-85; cost, earnings, value, 407; annual tonnage (1837-1905), 1062; annual tolls (1820-1882), 1064; cost and revenues, summary (1882), 1068; dates of opening and closing navigation (1824-1905), 1060; statistical tables, 1029, 1466, 1473; as a school of engineering, development of profession, 786-807; bibliography, 1173.
- Canals vs. railroads**, bibliography, 1314.

- Canals, United States, first canal, 7;**  
 Pope's bill (1810), 64; Porter's resolution (1810), 64, 956; Deep Waterways Commission (1895), 357; report of engineers, 370; histories, 1369; statistics, 1465.  
*See also names of states or canals.*
- Canal telegraphs, recommended (1867), 273; general system installed (1896), 364, 974; plans approved (1896), 366; reappropriations, 975, 977.**
- Canal-tolls, Baldwinsville canal, collection authorized (1809), 564, 1015; commissioners empowered to establish (1820), 98; first schedule (1820), 102; collector's offices established, 958; Oneida Lake Canal Co., charter privileges (1832), 656; reduction (1833), 133, 959; (1837), 959; Oneida Lake canal (1841), 659; wheat and flour (1858), 241; (1869), 277; (1870), 966; (1873), 287; (1875), 295; (Cayuga inlet) authorized (1836), 480; Chenango canal, rates equalized with Erie (1839), 684, 1002; (Oswego) effort to increase (1845), 455; Junction canal, established (1846), 757; reduction of 1858 condemned (1860), 251; revision of 1860, results, 252; authorized, Moose river, 1007; collections, Mohawk basin, 965; "free canals" advocated, arguments, 307; tolls on railroads, historical (1877), 308; free list, additions (1874), 309-10; free list criticised (1880), 313; "differential" rates, 315; abolished (1882), 316, 969; free canals (1883), 316, 969; auditor, appraiser and board of audit abolished (1883), 319, 969; table, N. Y. canals, 1064; bibliography, 1306, 1313.**
- Canastota, bridge, Peterboro st., 976, 977, 978.**
- Cape Cod ship canal, history, 1371.**
- Capron aqueduct, damaged (1869), rebuilt (1870), 691, 1003.**
- Carillon canal, history, 1447, 1461; statistics, 1476.**
- Carondelet canal, history, 1399; statistics, 1471.**
- Carpenter brook, feeder completed (1841), 960.**
- Carrying places, *see* Portages.**
- Carthage, bridges, 1006, 1009; dam built (1854), 1006.**
- Cascades canal, history, 1423; statistics, 1474.**
- Cassedaga Navigation Co., incorporated (1827), Conewango route, Chautauqua outlet, 709, 760.**
- Casson, Dollier de, Lachine canal, 7, 1453.**
- Catawba canal, history, 1398; statistics, 1471.**
- Catetunck Lock Navigation Co., incorporated (1815), 760.**
- Catharine creek, aqueduct rebuilt (1844), 996.**
- Caughdenoy, dam, lock, bridge, 570-3, 1016, 1017.**
- Cayuga and Seneca canal, inception (1824), 473; petition, survey, 474, 991; report, routes, estimate, canal authorized, alternative surveys (1825), 475, 991; State purchased company's rights, work begun (1826), 476, 992; completion (1828), 476, 992; Cayuga side-cut, lock, (1828), 477, 992; completed (1829), 478, 992; Seneca lake, water-level controversy, 478, 992; Cayuga inlet, history, 480, 992; stone locks authorized (1836), 481, 992; break, Seneca Falls (1836), 992; enlargement urged (1839), 482, 992; Seneca lake, controlling works proposed, 482; cutting bar, regulating weir proposed (1840), 483, 992; deepening upper level (1841), 484; "stop law" of 1842, 485, 992; effect, lake level controversy revived, new surveys, 485; flood damages (1843), 992; controlling works changed to Waterloo (1844), 486, 992; made "constitutional" (1846), 992; enlarged composite locks authorized (1847), 488, 992; lock survey, estimates, construction (1848), 489, 992; progress, lock enlargement (1849-55), 489-91-92, 993; Cayuga level, proposed Independent canal, Seneca river aqueduct (1849), 489-90, 993; constitutional amendment (1854), enlargement authorized, 492, 993; surveys and estimates (1854), progress (1854-7), 493; deepening authorized, Waterloo-Seneca lake (1857), 993; enlargement completed, 236, 494-5, 993; revised estimates (1858), completion law of 1862, 494, 993; pier built, Chamberlain's dam, 993; Waterloo dam raised, coal traffic (1867), 496, 993; mill spillways, defeat, projected Waterloo dam, continued agitation (1873), 498-9, 994; exempted from abandonment with other laterals, amendment of 1874, retrenchment, effect of Tilden investigation, 499; railroad encroachments, 499; dredging, Waterloo-Seneca lake, 498-501,**

- 994; Waterloo improvements, Old Bear race (1888-9), 501-3, 994; improvement locks Nos. 1, 2, 8, 501-2, 994; Cayuga lake branch improvement, 502-3, 994-5; tow-path extended, Geneva, 504, 995; new guard-lock, Geneva (1903), 396, 995; Barge canal survey authorized, estimates (1905), 504; annual tonnage (1837-1905), 1062; annual tolls (1826-1882), 1064; cost and revenues, summary (1882), 1068; statistical tables, 1032, 1466; bibliography, 1239, 1361.
- Cayuga inlet**, history, 480; public highway, 991; improvements, 480-1, 992, 993, 994, 995; pier built, 992; canal commissioners assumed charge, 481, 992, 993, 994; rebuilding pier, 502, 994, 995; annual tolls (1849-1882), 1866; cost and revenues, summary (1882), 1068; statistical table, 1032.
- Cayuga lake**, bar at inlet, removal, 481, 992; outlet improvement, 993; bibliography, 1265.
- Cayuga marshes**, early surveys, reports, 1017; drainage, early progress, 1017; later surveys, reports, improvements, 1018, 1019; commission appointed (1851), report (1852), 1018; improvements recommended (1853), 211, 1018; operations (1856), 228; results (1857), 236; drainage claims, 1018, 1019; N. Y. C. railroad crossing, 800; amount spent to 1862, 1019; bibliography, 1264.
- See also* Commissioners (draining Cayuga marshes).
- Cazenovia**, bridge, Forman st., 965.
- Cazenovia lake**, reservoir, survey, 190, 961; dam rebuilt (1856), 962.
- Central canal** (Belgium), history, 1493.
- Chambly canal**, history, 1447, 1460; statistics, 1450, 1476.
- Champlain canal**, water communication recommended (1791), 979; Gallatin's report (1808), 63; Pope's bill (1810), 64; commissioners propose Champlain canal (1812), 410, 979; N. Y. memorial, 73; commissioners' final report, 74, 410; new commission (1816), 75, 410, 979; report (1817), 410; active policy begins, 75, 410; Gavin, engineer (1816), 76, 412; plans for water-supply, 412; estimates (1817), 79, 413, 979; Tibbitts' financial plan, 82; tax-belt clause, 83, 979; construction authorized, act of 1817, 84, 414, 979; Goddes' discovery, Glens Falls feeder, 414; work commenced (1817), plans changed to four feet depth, 88, 414, 979; construction (1818-1823), opening, 113, 416, 980; tax-belt clause suspended (1819), 91; final non-action, 98; changes near Ft. Edward, independent canal (1824-6), 419, 980; floods (1833), 980; towing-path wall, Whitehall (built 1835-9), 422, 981; slope wall, Wood creek (built 1840-1), 423, 981; waste-weirs Nos. 6, 10, rebuilt, 980; Flynn, Moses Kill, aqueducts built, 422, 981; enlargement, Glens Falls feeder (1840-2), 423, 981; made "constitutional" (1846), 981; proposed ship canal improvement, objections (1850), 427, 981; break (1852), 982; locks to be enlarged (1854); Ft. Ann, new location, 428, 982; progress (1854-77), second lock enlargement, 982-4; increase of traffic, enlargement recommended (1857), 429, 982; estimates, 430; enlargement authorized (1860), 430, 982; excepted from "completion law," 258; break, Coveville (1858), 982; (1862), 982; gunboat surveys (1862), 261, 431, 982; gunboat locks, survey ordered (1863), 262; enlargement appropriations continued (1864), 432, 982, 983; flood damages (1865), 982; break, Ft. Ann (1867), 983; (1868), 983; Waterford (1873), 984; Coveville (1884), 984; Mechanicville (1890), 985; Wilbur's Basin (1898), 986; survey, enlarged canal and locks (1866), report (1867), 434, 983, 1021; completing enlargement, new surveys and estimate (1869-70), 276, 433; seven-foot plan (1870-75), 435, 983, 984; six-foot plan (1876), sundry improvements (1877-87), 436, 984; improvements (1885), 436, 984; new series of improvements (1887-9), estimates for completion (1891), 437, 985; definite plan urged (1895), 438; nine million improvement (1895), 363, 439, 985, 986; law regulating contracts (1896), 986; surveys, contracts, work stopped (1898), 440, 986; Barge survey (1900), 384, 977; route established (1903), 441, 987; first construction work (1905), 442; annual tonnage (1837-1905), 1062; annual tolls (1821-1882), 1064; cost and revenues, summary (1882), 1068; cross-sectional diagrams

(1818), 1055; (1860), 106d;  
(1870-5), 1056-7; (1891), 1057-8;  
(1896-8), 1058; (1903), 1052;  
tables of existing structures, 1112;  
statistical tables, 1031, 1466; bibli-  
ography, 1236, 1360.

*See also* names of localities.

**Chemung canal**, Sullivan's expedition, letter to Washington, early settle-  
ment, 607, 995; Geddes' survey  
(1812), 607; agitation, private cor-  
poration formed (1815), continua-  
tion of efforts to 1824-5, 610; sur-  
vey of 1825, Geddes' report and  
estimates (1826), 610, 995; legisla-  
tive inaction (1827-8), 612; con-  
struction authorized (1829), Hutch-  
inson's survey and estimates, 613,  
995; commissioners reluctant, or-  
dered by legislature to proceed  
(1830), 614-15; construction, pro-  
gress (1831-2), difficulties, defective  
locks, 616; completion (1833), 617,  
995; feeder dam near Corning, dif-  
ficulties, disastrous floods (1833),  
618, 995; Millport lock rebuilt, 995;  
proposed feeder extension, feeder  
dam chute (1838), 619; remon-  
strances, 620; feeder dam chute  
extended (1839), perils of raft  
navigation, 622, 995; proposed  
Pennsylvania canal connection,  
junction survey (1839), 623, 995;  
financial difficulties, project in  
abeyance, assumed by Junction  
Canal Co., 624; rebuilding the locks  
(1840), 625, 995; Catharine creek  
obstructions, independent line au-  
thorized (1841), 626, 996; surveys,  
alternative routes, estimates, con-  
struction, 626-7, 996; stop law of  
1842, 627, 996; flood (1843), 996;  
made constitutional (1846), 996;  
lock at Elmira rebuilt (1846), 627,  
996; Catharine creek, continued  
troubles, 628; new canal and chan-  
nel authorized (1848), survey and  
construction (1849), 628, 996;  
feeder, tow-path extended to Corn-  
ing (1850), 628; dilapidated locks,  
repairs, increase of traffic (1850),  
629; temporary lock repairs (1850-  
56), 630; connection with Junc-  
tion canal (1853), 758; rebuilding  
the locks (1856-67), 631, 996, 997,  
insufficient water-supply, reservoirs  
considered, estimates (1856), flood  
damages (1857), 632-3, 996; Junc-  
tion canal connected, 633, 996; lock  
enlargement, issue again revived,  
estimates, compromise measure  
(1858), 632-3, 996; flood damages

(1861), 633, 996; draught of boats  
increased (1862), 634, 996; raising  
the banks (1863), 634; basin built  
at Corning (1863), 996; lock, re-  
placed by culvert (1864), 996;  
flood damages (1865, '67, '70, '73),  
997; coal traffic, railroad terminus  
transferred to Watkins (1868),  
635; the passing of the canal, El-  
mira section abandoned (1872), 636,  
997; transferred to western di-  
vision (1877), 637; made "consti-  
tutional" (1846), amendment of  
1874, 637; abandonment, commis-  
sioners to consider, 637, 997; act  
of 1877, sale of structures (1881),  
638, 997; abandoned canal, dis-  
posal (1878-96), 997, 998; sanita-  
tion (1881-1904), 997, 998; slope  
wall, Corning (1886-91, 1903-5), 997,  
998; Montour Falls-Seneca lake  
section repaired, 638, 997, 998;  
present condition, 639; abandon-  
ment, study of causes, 763-85;  
annual tonnage (1837-1878), 1062;  
annual tolls (1833-1875), 1064; cost  
and revenues, summary (1882),  
1068; statistical tables, 1033, 1467;  
bibliography, 1244.

**Chemung river**, bibliography, 1267.

**Chenango canal**, early efforts, peti-  
tions of 1824, 673, 1002; "great  
canal law" of 1825, survey author-  
ized, 674, 1002; Geddes' survey,  
route described, project defeated,  
Forman's survey (1826), 674; al-  
ternative routes presented, legisla-  
tive failure (1827), Roberts'  
and Hutchinson's surveys, 675;  
Wright's examination and approval  
(1828), 626; work authorized, limi-  
tations (1829), Bates' survey, re-  
port (1830), 677, 1002; renewed  
appeals (1831-2), Gov. Marcy's fa-  
vorable views, construction author-  
ized (1833), 667-9, 1002; Jervis'  
survey and report (1833), Oriskany  
route adopted, contracts awarded,  
680-81, 1002; northern terminus,  
conditional change of location to  
Utica (1834), 681, 1002; construc-  
tion begun (1834), opened for nav-  
igation (1837), 682, 1002; stop law  
of 1842, 684; flood damages (1842),  
684, 1002; made "constitutional"  
(1846), 1002; water-supply, privi-  
leges for Utica asylum (1846, '59,  
'67), 1002, 1003; change to con-  
tract repair system (1855), later  
abuses of system, 686, 1003; grad-  
ual dilapidation of prism and  
structures, encroaching fences, re-



- port (1859), 686; rebuilding locks begun (1861-2), 688, 1003; progress (1861-72), 689-91, 1003; additional water-supply, Kingsley brook reservoir, rebuilding recommended (1862), 688; begun (1864), 689, 1003; completed (1867), 690, 1003; disastrous flood (1865), 689, 1003; (1867), 1003; (1868), 690; (1869), 691, 1003; larger locks ordered (1866), 1003; repair contract system abolished (1870), 691; abandonment discussed (1871), constitutional amendment (1874), 692; portion given to Binghamton for street (1872-3), 692, 1004; abandonment, canal board and special commission to consider, 693, 1004; report of special commission, portions to be retained as feeders (1877), 693, 1004; act of abandonment (1877), 694, 1004; disposal, abandoned canal, 694, 1004; State street, Binghamton, authorized (1878-80), 694, 1004; changes to feeder, present condition, 695; abandonment, study of causes, 763-85; annual tonnage (1837-1876), 1062; annual tolls (1837-1876), 1064; cost and revenues, summary (1882), 1068; statistical tables, 1034, 1467; bibliography, 1248, 1361.
- Chenango canal extension**, initial survey, route and estimate (1838-9), 690, 1014; alternative routes, 697; conference with Pennsylvania committee, "Junction" survey (1839), 698; "Junction" company incorporated (1846), 694; Childs' survey, report (1859-60), 698, 1014; construction authorized (1863), 701, 1014; funds provided, conditions, agreement with North Branch Co. (1864), 701, 1014; contracts let (1865), construction (1866-7), suspension, 703, 1014; work resumed (1868-70), again suspended, resumed (1871-2), finally abandoned, estimates, 705, 1014-5; subsequent history, 706, 1015; final disposition, 707, 1015; statistical tables, 1034, 1467.
- Chenango Junction Canal Co.**, incorporated (1846), 698, 760, 1014.
- Chenango river**, public highway, 1002.
- Chesapeake and Delaware canal**, history, 1393; statistics, 1470.
- Chesapeake and Ohio canal**, history, 1393; statistics, 1470.
- Chester**, bridge over Hudson, 1022.
- Chester canal**, history, 1500.
- Chicago drainage canal**, history, 1407; statistics, 1472.
- Chief clerks**, tabular list (1840-1847), 1137.
- Childs, Orville W.**, Oneida river surveys, removal Caughdenoy dam, lowering Oneida lake (1829), 571, 1016; Oneida river improvement (1838-9), 572, 1016; Erie water-supply surveys (1847), 215; Chenango canal extension survey, report (1859-60), 698, 1014; biography, 1152.
- Childs, Noadiah M.**, biography, 1151.
- Chinese canals**, histories, 1509.
- Chittenengo creek**, reservoir, survey, 961; aqueduct completed (1856), 962.
- Chittenengo Canal Co.**, incorporated, 90, 760, 957.
- Chub lake**, reservoir begun, 546, 550, 1006; completion urged, 1007.
- Chute-a-Blondeau canal**, history, 1447, 1461; statistics, 1476.
- Clauharty, Oscar M.**, biography, 1152.
- Clark, Frank B.**, biography, 1152.
- Clark and Skinner canal**, State improvement, 960; later improvement (1864), 964; State acceptance, 964; bridge, 964; appropriation for completing, 966.  
*See also* Buffalo slips.
- Cleveland, Grover**, canal offices abolished, 319.
- Clinton**, bridges, College st., Water st., 1003.
- Clinton, De Witt**, criticism on Inland Lock Navigation Co., 41; interest aroused (1810), 62; commissioner (1810), 63, 956; tour, journal (1810), 65; criticises plan, 66; N. Y. memorial, 73; commissioner (1816), 74, 410; removal as commissioner, 118, 958; re-elected Governor (1824), 120; criticises Federal tonnage scheme, 122; death, 959.
- Clinton, George**, in war of 1756, 20; urges improvements, 28, 955.
- Clubfoot and Harlowe Creek canal**, history, 1397.
- Clyde**, bridge, Glasgow st., 970.
- Coal Island canal**, history, 1505.
- Codorus Navigation canal**, statistics, 1469.
- Cohoes**, double locks completed (1842), 171; bridges: White st., 963, 964, 965; Vleet st., 963; Columbia st., 965; Ship st., 985; Main ave., High st., 973; Ontario st., 986; dam: completed (1822), 416, 980; raised (1862), 431, 982; stone

- dam authorized (1867), 433, 965, 983; completed (1872), 984; moving checked, 985; report (1892), 1023; rebuilt (1894), 346, 351, 438, 985; damaged (1904), 987; elevator lift proposed (1895), 360; wall, Ship st., 986; lock-lengthening, proposed aqueduct and mechanical lift, 366; pneumatic lock authorized (1899), 380, 976, 986.
- Cohoes Co.**, receives abandoned canal land, 959.
- Colden, Cadwallader**, first U. S. canal, 7; describes interior routes, 16, 51.
- Colden, Cadwallader D.**, comments on early (1724) routes, 17.
- Colles, Christopher**, survey, Mohawk river, 19; plans Mohawk improvement (1784), 23, 955.
- Columbia canal**, statistics, 1471.
- Commerce and navigation**, bibliography, 1318.
- Commissioners (draining Cayuga marshes)**, appointment, duties, reports, 1017, 1018; shortage in accounts—petitions, investigations, Comptroller's report, Assembly reports, legislative resolution, Attorney-General's report, 1017, 1018.
- Company's canal**, statistics, 1471.
- Comptrollers**, tabular list (1817-1905), 1134.
- Comptrollers, second deputy**, tabular list (1833-1839), 1137.
- Conestoga canal**, statistics, 1469.
- Congaree river**, canalization, history, 1425; statistics, 1474.
- Congress, United States**, Gallatin's report (1808), 63; Pope's bill (1810), 64; Porter's resolution (1810), 64, 956; action (1811), 68, 956; Calhoun's plan (1817), 80; Federal tonnage dues, 120; Niagara ship canal (1840), 164; memorialized for aid (1859), 245; Niagara project (1865), 266; Niagara surveys (1867), 267; senate committee, routes to seaboard (1873), 287; proposed Federal aid (1872), 321; Federal aid solicited (1885), 328; Niagara canal bill (1889), 333; Judson, Niagara ship canal (1892), other reports (1892-6), 336; ship canals, Maj. Kingman's statement (1892), 342; ship canal, proposed survey (1893), 409; pending canal bill (1894), 349; legislative efforts to obtain its aid; Deep Waterways Commission (1895), 357; ship canal, survey, Symon's report, 363; discussion (1898), 364; board of engineers, deep waterways, report, 370; deep waterways, further surveys asked (1903), 394.
- Connecticut canals**, histories, 1373; statistics, 1465.
- Constitution, New York**, canals first mentioned (1822), 111; canals and finances (1846), 178, 960; canal article, adoption (1846), 179; amendment of 1854, 214, 461, 492, 546; convention authorized, defeated at polls (1858), 243; work of convention (1867), defeated (1869), 271; ten million loan proposed (1869), 276; commission to amend (1872), 284; reports amendments (1873), 286; certain lateral canals, amendment of 1874, sale permitted, 286, 637, 651, 692, 724, 767; amendment of 1876, change of control, 302, 968; canal expenditures limited (1874), 304, 967; free canals, amendment proposed (1881), 315; amended, tolls abolished (1882), 316, 969; convention delegates, election authorized (1892), 342; convention deferred (1893), 343; amendment (1894), Main and Hamburg canal, sale permitted, 601, 973; convention of 1894, results, 350, 469, 973.
- Contracting board**, created (1854), 962; powers increased (1857), 962; powers diminished, 963; powers increased (1867), 965; abolished (1870), 278; powers to superintendent public works, 969.
- Cooper, John A.**, biography, 1152.
- Cooper, Wm. B.**, biography, 1152.
- Cooley, Lyman E.**, advisory engineer, investigation commission (1898), 375.
- Coosa river**, canalization, history, 1413; statistics, 1473.
- Corinth canal**, history, 1480.
- Corning, Erastus**, St. Mary's ship canal, 208.
- Cornwall canal**, history, 1443, 1455; statistics, 1476.
- Corthell, Elmer L.**, material furnished, 3; enlarged waterways, discussion (1891), 341.
- Council of Revision**, approves construction act (1817), 84.
- Countryman, Edwin**, reviews "Black" commission's report (1898), 375, 378, 976.
- Court of claims**, tabular list of members (1897-1905), 1139.
- Crane brook**, aqueduct rebuilt (1854), 962; destroyed, 965.

**Crinan canal**, history, 1508.

**Crocker, E. H.**, biography, 1152.

**Cronstadt and St. Petersburg canal**, history, 1480.

**Crooked Lake canal**, lake outlet, public highway (1809), 998; first survey authorized (1814), 640, 998; Seneca lake-Cohocton river plan, agitation (1827), 640, 998; survey again ordered (1828), report (1829), 641, 999; construction authorized, water-supply (1829), 642, 999; new survey ordered, report and estimates (1830), 643, 999; damage claims, releases (1830), construction begun, scarcity of labor (1831), 644, 999; completion, cost, dimensions (1833), 645, 999; water-supply, controversy (1833-6), 646, 999; flood damages (1833, '57, '63, '67), 999; pier at Dresden, 999; stop law of 1842, effect, 647, 999; deepening Seneca lake level, 648, 999; locks dilapidated, reconstruction authorized (1845), 648, 999; locks rebuilt (1846-50), 648-9, 999; Penn Yan, steamboat channel improved (1853-7), 649, 999; Penn Yan, guard-lock rebuilt (1863), 650, 999; deepening Penn Yan level (1864-70), 650, 999, 1000; lock reconstruction continued (1865-72), 650, 999, 1000; scarcity of water-supply (1872), 650, 1000; decline of commerce, abandonment discussed (1872), 651; abandonment, canal board and special commission to consider, 651, 1000; adverse report of special commissioners (1876), 652; officially abandoned (1877), 652, 1000; transferred to western division, sale authorized (1877), 652, 1000; disposal, abandoned canal, 652-3, 1000; sale to railroad company (1878), 653, 1000; present condition, 653; improvement, lake outlet, 1000; abandonment, study of causes, 763-85; annual tonnage (1837-1874), 1062; annual tolls (1833-1875), 1064; cost and revenues, summary (1862), 1068; statistical tables, 1033, 1467; bibliography, 1245.

**Cruger, Alfred**, surveys, Black River canal (1828), 512, 1005.

**Culverts**, tables, Erie canal, 1088; Champlain canal, 1118; Oswego canal, 1126.

**Cumberland and Oxford canal**, history, 1370; statistics, 1465.

**Cuylerville**, abatement of leakage, 1013.

**Dams**, tables, Erie canal, 1099; Champlain canal, 1119; Oswego canal, 1127; bibliography, 1176.

*See also* names of canals, streams and localities.

**Dearn and Dove canal**, history, 1502.

**Delaware and Hudson canal**, early transportation problems, unique position among canals, 729; Lackawanna coal fields, discovery by Wurts, 730; need of eastern markets, Lackawanna river improvement, New York State charter of the company, provisions (1823), 731-2, 760; first survey (1823), 732; Col. Sullivan's views, charter twice amended (1824), 734; opposition to plan, the banking feature, first board of managers (1825), 735; acquirement of coal lands and Lackawanna concession (1825), 736; adoption of route, contracts let, ceremony of breaking ground (1825), 737; Delaware river section, change of plan, proposed western extension, the "Susquehanna Co." (1826), 738; Mine-to-river section, inclined planes and railway considered, 739; banking department opened (1826), 739; Pennsylvania sections, amendatory acts, railway authorized (1826), 739; Susquehanna extension, Lackawanna to Deposit, Mills' survey for canal (1826), 739; (Susquehanna extension) Wright's examination and comments (1826-7), 740; State aid, first application, stock certificate plan (1827), 741; mortgage security, 742; construction, progress, difficulties (1827), 742; Pennsylvania section, railway, terminus to mines, tolls authorized (1827), 743; opened to traffic (1829), 743; State aid, second application, additional certificates (1829), 743; completion of line, mountain railway, inclined planes, first locomotive (1829), 744; description, 745; Delaware river crossing, modification of planes, stock transfer agent appointed (1831), 746; refunding loan, efforts to introduce hard coal (1831), 746; increase of traffic, growth of terminals, the first dividend (1832), 747; overproduction of 1833, restricted mining of 1834, 747; bitter rivalry, efforts to extend trade, railway improvements, first enlargement, the "Seymour plan," 748; banking discontinued (1844), deepening to five and a half feet

- (1846), Delaware river suspension aqueduct (1848), 749; third enlargement, six feet depth (1850), State loans paid (1848-50), Lackawaxen concession made perpetual (1852), death of Maurice Wurts (1854), 749; Pennsylvania Coal Co., traffic contract (1847), 749; extension of railway and mines (1857), increase of capital stock (1864), 750; further expansion, leases and connections, western markets opened, 750; from gravity to double-track steam railroad, Albany and Susquehanna lease, Rensselaer and Saratoga absorption, Canada line, 750; present traffic and earnings (1904), 750; change of name, abandonment authorized (1899), present condition, 751; statistical table, 1467; bibliography, 1254.
- Delaware and Raritan canal**, history, 1376; statistics, 1467.
- Delaware and Susquehanna Navigation Co.**, chartered (1825), 738, 761.
- Delaware Division canal**, history, 1381; statistics, 1468.
- Deputy State Engineer and Surveyor**, appointment and duties, 962; tabular list (1857-1905), 1140.
- Deputy Superintendent of Public Works**, office created, 974; tabular list (1896-1905), 1139.
- De Ruyter reservoir**, *see* Limestone creek.
- Desjardins canal**, history, 1463.
- Des Moines Rapids canal**, history, 1415; statistics, 1473.
- De Witt**, bridge, Nicholas st., 972, 973, 975.
- De Witt**, Simeon, commissioner (1810), 63, 956.
- Dismal Swamp canal**, history, 1397; statistics, 1470.
- District of Columbia canals**, history, 1393; statistics, 1470.
- Division engineers**, tabular lists (1850-1905), 1140-1.  
*See also* State Engineer and Surveyor.
- Documents**, New York legislative, bibliography of indexes, 1184.
- Dortmund-Emshafen canal**, history, 1490.
- Dortmund-Rhine canal**, history, 1491.
- Dreher's canal**, history, 1398; statistics, 1471.
- Dunham's Basin**, waste-weir rebuilt, 980.
- Dun Navigation**, history, 1502.
- Dunning**, Wm. D., biography, 1153.
- Dutch canals**, histories, 1486.
- Dutton, Chauncey N.**, mechanical lifts, Cohoes and Lockport, 367.
- Earll, Jonas**, death (1846), 960.
- Eastern Division (Erie canal)**, created 1816), 76; construction authorized, 91, 957; difficulties, location (1821), 106; Schenectady relocation, 107; completed (1823), 113, 958; proposed relocation, lock changes (1836), 149; lock masonry completed (1841), 960; stream crossings, aqueducts, 156; double locks throughout (1860), 251; difficulties of construction, 796; wall benches, condition (1862), 259; mileage remaining (1866), 267; removal (1868), 275, 965; Black River canal transferred to middle division (1876), 550, 1008; cross-sectional diagrams (1848-62), 1039.  
*See also* names of localities.
- East river**, bibliography, 1267.
- Eaton, Amos**, geological survey (1822), 115.
- Eddy, Thomas**, investigates Erie route, 52; commissioner (1810), 63, 95-6; renewed efforts (1815), 72.
- Elbe and Trave canal**, history, 1481.
- Elbe river**, canalization, history, 1489.
- Elbridge**, State ditch, 974.
- Ellesmere canal**, history, 1500.
- Ellicott creek**, improvement (1838), 959.
- Ellicott, Joseph**, early map, western section, 59, 65; commissioner (1816), 74, 410.
- Ellicott's Creek Slack-water Navigation Co.**, incorporated (1829), 760.
- Elmira**, bridges: 996; Cross st., 996, 997; Second st., 996; Fifth st., 997; Baldwin st., 997.
- Emerson**, bridge, 967.
- Enfield Falls canal**, statistics, 1465.
- Engineers**, biographical sketches, introduction, 1145; instances of long services, 1145.  
*See also* names of engineers.
- English canals**, histories, 1480, 1497.
- Erie basin**, improvement (1866), 965; breakwater, removal, 965; wrecked, 967; repaired, 968; deepening (1894), 350, 973; (1898), 976; placing buoys, 974.  
*See also* Buffalo slips.
- Erie canal**, early difficulties, 49; Col- den's suggestion, 51; Jeffrey Smith's bill, 51; Schuyler's prediction, 51; Eddy's investigations, 52; Morris' claims, 52; Hawley's scheme, 54; Forman's resolution, 56; Geddes' survey (1808), 60, 787,

956; efforts for Western Co. (1810), 61; Platt's plan (1810), 62; Clinton's interest, 62; commissioners appointed (1810), 63, 956; Gallatin's report (1808), 63; Pope's bill (1810), 64; Porter's bill (1810), 64, 956; inclined plane, 66, 69; Wright's surveys (1812), 71; N. Y. memorial, 73; commissioners' final report, 74, 957; new commission (1816), 75, 957, 979; active policy begins, 75; division into sections, 76; estimates (1817), 77, 957; Tibbitts' financial plan, 82; tax-belt clause (1817), 83; construction act, 84, 957; construction begun, Rome, 86, 957; Holland grants accepted, 91, 957; tax-belt clause suspended (1819), 91; final non-action, 98; absorbs Western Inland Lock Navigation Co., 99, 957; tolls levied (1820), 98, 957; first toll-sheet, 102; geological survey (1822), 115; Rome level, water-supply Black River project (1825), 507; ceremonies, completion (1825), 123, 958; passenger traffic in 1825, 958; "bank wash," 132; double locks inaugurated, 132, 959; enlargement, first step (1834), 133; double locks, authorized, Albany to Syracuse (1834), 135, 959; enlargement authorized (1835), 145, 959; surveys for enlargement (1835), 146; enlargement begun (1836), 151, 959; break (1837), 959; (1846), 960; (1858), 963; \$4,000,000 loan (1838), 155, 959; increased estimates (1838), 156; estimates again increased (1839), 159; work retarded, financial trouble (1839), 160; further loans (1840-1), 164, 960; first iron bridge (1840), 164, 803; stop law (1842), 169, 960; constitution of 1846, 179, 960; revised estimates (1847), 180; change in dimensions (1848), 188; "the big letting" (1851), 199; work again stopped (1852), 202; temporary completion, "wedging" (1852), 202; revised estimates (1854), 214; wall benches, removal advocated (1856), 225; capacity increased (1857), 236; breaks, Palmyra, Bushnell's basin (1859), Lockport (1860), 963; declared completed, 257, 258, 958; lock estimates, national defense (1862), 262, 964; "gunboat" project, S. S. Ruggles, commissioner to Congress, 964; survey for "gunboat locks," estimates (1863), 262, 964; freshet (1863), 964; break,

Whitesboro (1864), 964; leakage at Lockport, 964; benches, condition in 1865, 265; tumble-gates (1865), 265, 964; break, Schenectady (1866), 965; flood (1865), Rochester compensated, 965; benches remaining (1868), 275; completing, new estimates (1869), 276; maintenance, dredges recommended, 966; break, Pool's brook (1869), 966; benches remaining (1870), 281; break, Fairport (1871), 966; benches remaining (1872), 285; flood (1873), 967; "blue line" maps completed, 275, 965, 967; benches (1874), 289, 967; deficient dimensions, causes, 291; double locks throughout (1874-5), 292, 967; wall benches (1875), 299; "bottoming out" (1880), 969; break at Utica (1880), 969; cost and revenues, summary (1882), 317, 1068; beneficial effects, 321; traffic (1883), 319-20, 969; regulates rates, Fink's testimony, 322, 906; encroachments, report (1884), 969; lock-lengthening (1886-7), 328, 970; leakage at Rochester, provision, 970; break, Adam's basin (1888), 970; lock-lengthening continued (1889), 332, 970; breaks (1889), 971; Whitesboro (1890), 971; bottoming out (1890), 971; navigation season (1891), extended on petition, 972; nine-foot plan, Barge canal (1893), 343, 345; deepening to nine feet, wall benches remaining (1894), 349; other improvements (1895), 356, 973; break, Pattersonville (1895), 974; nine million improvement begun (1896), 363, 974; law regulating contracts (1896), 365, 974; flood, Pendleton (1896), 974; nine million improvement suspended, 374, 976; break near lock No. 24 (1898), 976; Spencerport (1899), 976; nine million improvement, status in 1899, 379, 976; Federal plan, enlargement, continuous descent, 364; Barge survey (1900), 384, 977; proposed junction with Barge canal, Fort Bull, 394; breaks, Durhamville (1902), 978; Rexford Flats (1903), 978; Fort Hunter (1904), 398, 978; walls slide (1904), 978; eastern division, difficulties of construction, 796; water-supply; Lockport level, Irondequoit embankment, 794; Cayuga marshes, Seneca river level, 795; cost, earnings, value, 407; cross-sectional diagrams (1817), 1037; (1836-48),

1038; (1848-62), 1039-48; (1890), 1049; (1895), 1050; (1903), 1052; dates of opening and closing navigation (1824-1905), 1060; annual tonnage (1837-1905), 1062; annual tolls (1820-1882), 1064; tables of existing structures, 1069-1111; statistical tables, 1030, 1466; bibliography, 1215, 1356.

*See also* Influence of Erie canal, and names of divisions and localities.

**Erie Extension canal**, history, 1382; statistics, 1468.

**Erieville**, reservoir (1850), 961.

**Estherville and Minim Creek canal**, history, 1411.

**Evershed, Thomas**, death, 971; biography, 1153.

**Fairfield canal**, statistics, 1470.

**Fairport**, bridges, Parker st., 965, 970; Main st., 350, 973.

**Farmington canal**, history, 1373; statistics, 1465.

**Farnum, Henry H.**, biography, 1153.

**Farran's Point canal**, history, 1443, 1456; statistics, 1476.

**Fayetteville**, bridge, 965.

**Fay, John D.**, towage commission, 282; biography, 1153.

**Feeders and reservoirs**, table, Erie canal, middle division, 1103; bibliography, 1324.

*See also* Water-supply.

**Fink, Albert**, views, canal regulates rates, 322, 908.

**Fish creek (Champlain)**, aqueduct completed (1821), 416, 979.

**Fisher, Charles H.**, biography, 1153.

**Fish, Hamilton**, Niagara ship canal (1853), 212.

**Flagg, Azariah C.**, financial policy (1836), 173; reviews canal policy (1848), 185.

**Flat Stone creek**, aqueduct collapses, 971.

**Floods**, *see* names of canals.

**Florida, canals**, history, 1399; statistics, 1471.

**Forestport feeder**, *see* Black River canal.

**Forman, Joshua**, aids Erie survey, 56, 956.

**Forman, Owen**, Chenango canal survey (1826), report (1827), water-supply, 674.

**Fort Ann**, 3 locks rebuilt, 420, 980.

**Fort Edward**, contracts, dam and feeder (1820), 979; dam repaired (1822), 418, 980; guard-lock completed, 420, 980; lock rebuilt, 980;

creek aqueduct replaced, 422, 981; feeder and dam abandoned, 425, 981; feeder bridge, 982; bridge, Case st., 983; McIntyre st., 983; aqueduct built, 983; bridge, East st., 983; feeder bridge, 984; wall repairs, 985.

**Forth and Clyde canal**, history, 1506.

**Fort Miller**, dam built (1820), 415, 979; partly demolished, repairs (1827), 420, 980; lock completed (1842), 424, 981; side-cut closed, abandoned, dam removed (1849-51), 426-7, 981; bridge destroyed, 982; bridge, 983; purchase of bridge, 1024; dam rebuilt (1869-74), 983, 984.

**Fort Plain**, lift-lock, 132, 958; bridges, 968, 975; Main st., 970.

**Foster's Meadow Canal and Dock Co.**, incorporated (1859), 760.

**Fox river**, canalization, history, 1437; statistics, 1475.

**Frankfort**, bridge 962.

**French canals**, histories, 1483.

**French creek canal**, history, 1382; statistics, 1468.

**Fuller, Charles L.**, biography, 1154.

**Fulton**, bridges, Broadway, 989, 990; Oneida, First sts., 991; sewer under canal, 990.

**Fulton, Robert**, commissioner (1811), 67.

**Fultonville**, bridge, Main st., 971.

**Galena river**, canalization, history, 1435; statistics, 1475.

**Gallatin, Albert**, report to Congress (1808), 63.

**Galops canal**, history, 1443, 1456; statistics, 1476.

**Garin, G. Lewis**, Champlain canal (1816), 76; preliminary survey, 412, 788.

**Gasport**, bank strengthening, 974.

**Galveston and Brazos canal**, history, 1423; statistics, 1474.

**Geddes**, bridge, Geddes st., 961.

*See also* Syracuse.

**Geddes, George**, reports, draining Cayuga marshes, 1018; towage commission, 282; biography, 1154.

**Geddes, James**, Erie canal route (1808), 788; survey of 1808, Ontario route, 59, 444, 570, 956, 987, 1016; locates western division route (1810), 65; Chemung canal survey (1812), 607; resurvey (1825), 610; western division (1816), 76, 788; Champlain canal (1817), 86, 414, 789; Oneida lake

- test levels (1818), 86, 788; Baldwinville canal, examination, report (1818), 565, 1015; Black River canal surveys (1825), 507; report (1826), 1005; Genesee Valley canal, survey (1825), 710; Chenango canal survey (1825), report (1826), 674, 1002; water-supply, Lockport level, Irondequoit embankment, 794; Cayuga marshes, Seneca river level, 795; reports, draining Cayuga marshes, 1017, 1018; biography, 1154.
- Genesee river**, made public highway (1813), 1010; feeder completed (1822), 958; aqueduct completed (1823), 112, 958; feeder dam raised, 132, 958; Genesee Valley canal, hydraulic privileges considered (1836), 712; aqueduct enlargement begun, 959; feeder enlargement completed (1838), 959, 1010; aqueduct at Mount Morris, construction abandoned (1839), 715, 1011; new aqueduct completed, 171, 960; feeder dam destroyed, 190; mill owners' claims (1854), 214; settled (1856), 223; Rochester dam completed, 264, 904; alteration, 965; feeder, closing, law for and report against, 968; retained, 968; storage dam project, feeder dam, historical, 337; water-storage project, commissioners appointed (1891), 342; Rafter survey authorized (1893), 347; Rafter's report, petition (1894), 351; project defeated (1895), 357; final report, 368; bibliography, 1267, 1362.
- Genesee Valley canal**, Clinton's message, survey ordered, alternative routes (1825), 709, 1010; Geddes' survey (1825), 710; Conewango route, 709; act of 1830, Mill's survey of 1834, report (1835), 711, 1010; construction authorized (1836), Dansville side-cut, Rochester hydraulic privileges, 712, 1010; construction contracts let (1837), 712, 1010; progress of construction (1838-9), navigation open to Mount Morris (1840), 713, 1010, 1011; report, Oil creek, Rockville and Ichua creek reservoirs (1839), 1011; floods and breaks (1840), 1011; (1855, '56, '57, '61, '63), 1012; (1864, '65, '72, '78), 1013; Dansville branch opened (1841), "stop law" and its effect, 714, 1011; aqueduct, Mount Morris, change of plans (1839), 715, 1011; Dansville side-cut, slip, construction, connection with side-cut (1844), 715, 1011; Dansville slip and basin, legislation (1846-8), 1011; assumption by State (1851), 716, 1011; canal made "constitutional" (1846), 178-9, 1011; investigation, 181; resumption of appropriations (1847), 716, 1011; construction period—the Portage tunnel and aqueduct (1847), Conesus lake reservoir (1848), tunnel abandoned, 717, 1011; Conesus, Canadice, Honeoye and Hemlock lakes for water-supply (1849), 1011; construction of main line (1849-57), 718, 1011, 1012; "the big letting" (1851), 199; work again stopped (1852), 202; revised estimates (1854), 214; navigable feeder to Wellsville, survey, report (1854-5), 719, 1012; damage claims settled (1856), 223; Mill Grove extension (1856-7), 719-20, 1012; completion (1861), water-supply, feeders and reservoirs, 721, 1012; additional water-supply (1863-9), 722-3, 1012, 1013; lock-rebuilding (1864-7), 722, 1012, 1013; Mud and Nunda locks changed (1868-71), 722, 1013; constitutional amendment (1874), sale or lease authorized, 724; adverse report of canal board (1875-6), report of special commission (1876-7), 725, 1013; the act of 1877, abandonment authorized (1878), amendments of 1878-9; sale (1880); exceptions, Allen's creek feeder, 726, 1013; sale of main line (1880), exceptions, 726, 1013; sale of Dansville side-cut and reservoirs (1882), 726, 1014; sanitation, abandoned canal (1881-95), 1014; Ohio basin (Rochester) extended, abandoned land released to city, 1014; repairs on retained portions, report (1889), 1014; annual tonnage (1840-1878), 1062; annual tolls (1840-1878), 1066; cost and revenues, summary (1882), 1068; abandonment, study of causes, 763-85; statistical tables, 1035, 1467; bibliography, 1251.
- Geneva**, bridge, Evans st., 993; pier built, 496, 993; bridge, Teal's, repairing pier, 994; pier rebuilt, 994.
- Georgia canals**, history, 1398; statistics, 1471.
- Gere, W. H. H.**, biography, 1154.
- German canals**, histories, 1488.
- German Flats**, bridge, Otsego st., 967.
- Gibson** (Chemung canal), dam destroyed, rebuilt, 997.
- Gill, Valentine**, surveys (1819), 93.

- Glen creek (Watkins), improvement, 998.
- Glens Falls, bridge, Glen st., 986.
- Glens Falls feeder, Geddes' discovery (1817), 414; engineers re-examine route (1821), White's survey (1822), 417, 979; construction determined, legislative act (1822), completion (1827-8), 418, 980; completion law (1826), 980; Hutchinson's survey and estimates (1834), 420, 980; guard-lock rebuilt, stone (1835), 421, 980; enlargement, stone locks authorized, contracts (1836), 421, 980; widened, Glens Falls, 980; locks rebuilt of stone (1837-9), 421, 981; Olmstead's survey, plans, enlargement (1840-2), 423, 981; dam raised, 425, 981; leakage, continued efforts to prevent (1843-6), 425; pier built at dam, 982; estimates, enlargement authorized (1860), 430, 982; enlargement appropriations continued (1864), 432, 982, 983; removing big bevel, 983; guard-lock rebuilt (1869-71), 983-4; dam rebuilt (1869-72), 983, 984; wooden locks rebuilt (1873-5), 984; break (1893), 985; repairs (1895), 985; statistical tables, 1031, 1466.
- Goodsell, J. Platt, canal policy (1867), 273; biography, 1154.
- Goodsell, Thomas, biography, 1155.
- Gowanus canal, incorporated (1837), 760.
- Grand canal (China), history, 1509.
- Grand canal (Ireland), history, 1504.
- Grand canal, *see* Erie canal.
- Grand Junction canal, history, 1501.
- Grand River navigation, history, 1463.
- Granville Canal Co., incorporated (1825), 760.
- Gray, George E., biography, 1155.
- Great Chazy Navigation Co., incorporated (1836), 760.
- Great Kanawha river, canalization, history, 1429; statistics, 1475.
- Green and Barren rivers, canalization, history, 1431; statistics, 1475.
- Greene, aqueduct built, 685, 1002; bridge, Genesee st., 1003.
- Greene, David M., engineer, towage commission (1871), 282; biography, 1155.
- Grenville canal, history, 1447, 1461; statistics, 1476.
- Grove Spring, bridge, 962.
- Hall, George T., biography, 1156.
- Hamilton, bridges: Lebanon st., Eaton st., 1003.
- Hampshire and Hampden canal, history, 1373; statistics, 1465.
- Hanks, Byron M., biography, 1156.
- Harlaem Canal Co., incorporated (1826), 760.
- Harlaem River Canal Co., incorporated (1827), 760.
- Harlem river, bibliography, 1268.
- Harlem ship canal, history, 1410; statistics, 1473.
- Hartwell, Daniel R., biography, 1156.
- Hartwell, Orville C., biography, 1156.
- Hartwell, Reuben A., biography, 1156.
- Harvey's canal, statistics, 1471.
- Hasbrouck, Robert M., biography, 1156.
- Havana, basin constructed, 638, 998; bridges, Schuyler st., 998.
- Hawley, Jesse, formulates Erie scheme, 54, 956.
- Heath, George, tumble-gates tested (1870), 280, 283, 967.
- Hennepin canal, history, 1414.
- Herkimer, bridge, 970.
- Hersey, John C., biography, 1157.
- Higginsville, bridge, 964; wall (1895), 973; swing-bridge, 1002.
- Himes, Albert J., survey "Oswego route" (1895), 359; deep waterway survey (1897), 371.
- Hocking branch canal, history, 1399; statistics, 1472.
- Hoffman, Michael, recommends "stop law" (1842), 168.
- Holland canals, histories, 1486.
- Holland Land Co., donation to State (1814), 91, 957; grant accepted (1819), 91, 957.
- Holley, Myron, commissioner (1816), 74, 410.
- Hooksett Falls canal, statistics, 1465.
- Horseheads, bridges, 996, 997.
- Howell, David J., deep waterway survey (1897), 371.
- Hudson and Harlem River Canal Co., incorporated (1863), 760.
- Hudson and Mohawk Lock Navigation Co., incorporated, 760, 957.
- Hudson river, early navigation, Dutch ordinances (1648, 1660, 1664), 1019; laws (1792), obstructions, flood-gates, fishways, 1019; pile dykes, dam (1797-9), 1019; improvements, appropriations (1799-1810), Stillwater-Albany, 1019; improvement plans (1815-35), State and Federal surveys and appropriations, 1020; first canal-boat enters (1823), 114, 958; canal survey, upper waters (1839), 1020; improvements (1840-58), occasional appropriations, 1020, 1021; clearing channel, upper



- waters (1840), 1020; Government beacons and survey, 1021; improvements, Troy-New Baltimore, series of large appropriations begun, system of dykes started (1863), 1021; reports (1864, 1866), 1021; dykes built Coeymans, Castleton, Pictaway, Greenbush, Cuylers bar, Willow island, Schodack, Mill's light, New Baltimore (1863-7), 1021; surveys, slack-water navigation (1865-6), report (1867), 434, 983, 1021; dredging (1872), 1022; dumping refuse regulated (1876), 1022; improvements, Troy Coxsackie, annual appropriations, dimensions (1876-92), 1022, 1023; vardage dredged, annually (1876-92), 1022, 1023; fixing pier lines (1877, '89, '92, '95), 1022, 1023, 1024; depth, report (1877), 1022; cutting ice, regulations, 1021, 1022, 1024; lights on swing-bridges, regulation (1880), 1022; land ceded to U. S., 1020, 1023, 1024; survey, upper waters (1884), 1023; (1895-6), 1024; mole, Houghtaling island, 1023, 1024; U. S. Government assumes improvement work (1891), 1023; cost of dredging (1797-1893), 1024; proposed improvement, Barge canal estimates (1903), 394; Palisades park (1895, '96, 1900), 1024; navigation regulations (1897), 1024; dates of opening and closing navigation (1824-1905), 1060; bibliography, 1269, 1362.
- Hudson River Bridge Co.**, incorporated, 1021.
- Hudson River Power Transmission Co.**, dam legalized, 1024.
- Hudson River Water Power Co.**, dam authorized, 1024.
- Hudson's River Canal and Channel Co.**, incorporated (1806), 760.
- Hughes, B. and D.**, dredge testing, 966.
- Hunt, Washington**, revenue certificate plan (1851), 192; loan plan, amendment plan (1851), 193; certificate plan adopted, 193.
- Hutchinson, Holmes**, examines Syracuse-Oswego route (1824), 449, 987; Shinnecock and Peconic survey and report (1826), 577-8, 1024; Chenango canal survey (1827), report (1828), 675, 1002; Crooked Lake canal survey (1829), 643, 999; Chemung canal, survey and estimates (1829), 613; Glens Falls feeder survey (1834), 420, 980; "blue line" maps (1834), 980, 988, 992, 999; investigates relative costs, canals *vs.* railways (1835), 143; surveys, Erie canal (1835), 146; Black River canal, survey, report, 516, 1005; estimates, 518; inclined planes, adverse report (1836), 530; biography, 1157.
- Ilion**, bridge, 965; Railroad st., 975, 976.
- Illinois and Michigan canal**, history, 1406; statistics, 1472.
- Illinois and Mississippi canal**, history, 1414; statistics, 1473.
- Illinois canals**, histories, 1406, 1414, 1436; statistics, 1472, 1473, 1475.
- Illinois river**, canalization, history, 1435; statistics, 1475.
- Imperial canal (China)**, history, 1509.
- Inclined planes**, Black River canal, preferred to locks (1828), 512-13; merits discussed, 518-23; adverse report, 527; (1836), 531.
- Indiana canals**, history, 1405; statistics, 1472.
- Influence of Erie canal**, broader phases, 808; on Great Lakes, 814; on N. Y. State, general discussion, 824; statistical study, 839; —population, 846; —male aliens, 861; Agricultural: acreage, 869; —number of persons, 872; —per capita acreage, 873; Manufacturing: number of persons, 877; manufacturing, 878; Commerce: number of persons, 882; agriculture, manufacturing, commerce, —general discussion, 884; property, assessed valuation, 886; further indices of influence, 894; comparison of shipments, 895; growth of "canal" cities, 900; tables on which study of canal influence is based, 909-954.
- Investigations**, legislative committee (1846), findings, 181; legislative (1852), 201; assembly (1853), 209; legislative (1867), 269; (1871), 966; (1875), recommendations, 296, 968; Tilden commission (1875), 297; their report (1876), 298; canal board given power, 302, 968; terminal charges (1880), 313; assembly (1891-2), 340, 971, 972; the "Black" commission (1898), appointment and report, 374, 976; N. Y. Commerce Commission, term extended (1899), 380; Judge Countryman's findings, Superintendent Aldridge suspended, 378, 976; Roosevelt appoints counsel, 379; N. Y. Commerce Commission, final

- report, recommendations, 382; bibliography, 1301.
- Iowa canal**, history, 1415; statistics, 1473.
- Irish canals**, histories, 1503.
- Irondequoit creek**, embankments, aqueduct, 101; feeder, 102; culvert, 104.
- Ithaca**, bridges, State st., Buffalo st., 994.
- Ithaca and Port Renwick Railroad Co.**, incorporated (1835), 760.
- Jack's reef**, early improvement, 1017; later improvement, 1018; bridge over State ditch, 965, 1019; damage claims, 1019.  
*See also* Cayuga marshes.
- Jamaica Canal and New York Inland Navigation Co.**, incorporated (1859), 761.
- James River and Kanawha canal**, history, 1395; statistics, 1470.
- Jamesville reservoir**, *see* Butternut creek.
- Jefferson County Canal Co.**, incorporated (1828), 761, 1005.
- Jefferson, Thomas**, considers canal premature, 9, 49, 61; felicitations at its completion, 129.
- Jervis, John B.**, connection with the building of the Erie, 791; engineer Delaware and Hudson canal (1825), 736; Chenango canal, appointed engineer, report, Oriskany route adopted (1833), 680, 1002; investigate relative costs, canals *vs.* railroads (1835), 143; surveys, Erie canal (1835), 146; biography, 1157.
- Jervis, Timothy B.**, surveys Black River route (1834), report (1835), 526-8, 1005.
- Johnsburg**, bridge over Hudson, 1022.
- Johnson, E. F.**, Ontario-Hudson plan (1835), 143.
- Johnsville**, feeder dam (1823), 113, 958.
- Jordan level**, original summit level eliminated (1837), 153, 959; completed (1845), 960; drainage, 960; feeder (1847), 961.
- Judah, Theodore D.**, biography, 1157.
- Judson, William Pierson**, Niagara ship canal project, report (1890), 336; Oswego-Oneida-Mohawk route, report (1896), 364.
- Junction canal (Canada)**, *see* Galops canal.
- Junction Canal Co. (Champlain)**, incorporated (1828), 761, 980; time extended, 980; purchase planned, authorized, 981; bibliography, 1231.
- Junction canal (Chemung—"Arnot's canal")**, purpose explained, 752; first petition (1839), 752; Pennsylvania's interest, conference at Albany, survey authorized (1839), report (1840), 753; route of South line, 754; route of North line, 755; estimates, legislative delay, Junction Canal Co., incorporated (1846), 756.
- Junction Canal Co. (Chemung)**, incorporated (1846), 756, 761; charter renewed (1852), Pennsylvania charter, mortgage lien authorized (1853), construction begun (1853), 757; connection with State canal system authorized (1854), 624, 996; Chemung canal connected, 633, 996; completion (1858), cost, name changed (1866), railway authorized, closed and abandoned (1871), 758; railroad authorized, 758; 997; statistical table, 1467; bibliography, 1256.
- Kaiser Wilhelm canal**, history, 1481.
- Kaley, John R.**, biography, 1158.
- Kelly, John P.**, biography, 1158.
- Kent, James**, saves construction act (1817), 84.
- Kentucky canals**, histories, 1411, 1420; statistics, 1473, 1475.
- Kentucky river**, canalization, history, 1431; statistics, 1475.
- Keweenaw Bay and Lake Superior waterway**, history, 1420.
- Kiel canal**, history, 1481.
- Kimball, Bruce J.**, biography, 1158.
- Kimball, Morris S.**, biography, 1158.
- King, John A.**, urges completion enlargement (1857), 229; urges railroad tolls and tax (1858), 237.
- Kingsley brook reservoir**, destroyed, 684, 1002; restored, 680, 690, 1003.
- Lachine canal**, first attempt, 7; history, 1441, 1454, 1456; statistics, 1476.
- Lackawaxen canal**, statistics, 1470.
- Lagan canal**, history, 1505.
- Lake Borgne canal**, statistics, 1471.
- Lake Erie navigation**, dates of opening (1827-1905), 1060.
- Lake Ontario route**, objections, 48, 66; surveys (1808), 59, 443, 956, 987; effect of N. Y. memorial, 73.
- Lake Superior ship canal**, history, 1420.
- Landsford canal**, history, 1398; statistics, 1471.

- Lasher, Winfield S.**, biography, 1158.
- Lateral canals**, abandonment, history, study of causes, 763-85.  
*See also* names of canals.
- Latimer, Eden B.**, biography, 1159.
- Laws, New York**, bibliography of indexes, 1184.
- Ledlie, James H.**, biography, 1159.
- Leeds and Liverpool canal**, history, 1499.
- Leeds district canals**, histories, 1497.
- Lebanon branch canal**, statistics, 1472.
- Lehigh canal**, history, 1384; statistics, 1469.
- Lehigh canal extension**, history, 1384; statistics, 1469.
- Lehigh Coal and Navigation Co.**, history, 1384; statistics, 1469.
- Leutze, Trevor C.**, death, 978; biography, 1159.
- Leveling**, precise, bibliography, 1352.
- Levisa fork**, canalization, history, 1430.
- Lieutenant-Governors**, tabular list (1817-1905), 1134.
- Lighthall, John A.**, biography, 1159.
- Limestone creek**, feeder completed (1826), 132, 958; reservoir, survey, 961; estimate, 962; feeder, pay for damages, 963; DeRuyter reservoir, used (1862), completed (1863), 964; improved, 965.
- Little Falls**, portage, 17; early methods, 19; proposed sluices, 21; work commenced (1793), 36, 41, 955; locks completed (1796), 39, 955; feeder and aqueduct completed (1822), 958; bridge, Mill st., 962; improvement, old feeder, 964; tumble-gates introduced (1865), 265, 964; Western Navigation Co., historic relic preserved, 319, 969; stone dam authorized, 344, 972; bridges, Ann st., 972; German st., 974, 975, 976; lock-lengthening considered, 367.
- Little Kanawha river**, canalization, history, 1429; statistics, 1474.
- Liverpool**, ditch repaired, 469, 990; bridge, Sycamore st., 990.
- Liverpool district canals**, histories, 1499.
- Livingston, Robert R.**, commissioner (1811), 67.
- Lockart's canal**, statistics, 1471.
- Lockport**, locks designed by Roberts, 797; rock cuttings, 104; raceway (1828), 959; investigation (1846), 181; revised estimates (1847), 181; bridge, Pine and Lock sts., 961, 977; lock-lengthening, objections (1859), 249; bridges, Main st., Cottage st., Prospect st., 970; Adam st., 350, 973, 974, 975, 977; nine million improvement, difficulties, Rafter's report (1890), 363; proposed mechanical lift (1896), 367; bridge, Chapel st., 976, 977, 978.
- Locks**, *see* Canal-locks.
- Lockville**, lock rebuilt, 959; double lock completed (1840), 960.
- London district canals**, histories, 1500.
- Long Island Canal and Navigation Co.**, incorporated (1848), 578, 761, 1024.
- Long Island Canal Co.**, incorporated (1828), 578, 761, 1024.
- Long Island canals**, bibliography, 1345.
- Loomis, Arphaxad**, "peoples resolution" (1841), 166.
- Lorick's canal**, history, 1398; statistics, 1471.
- Louisiana canals**, histories, 1399, 1435, 1439; statistics, 1471, 1475.
- Louisville and Portland canal**, history, 1411; statistics, 1473.
- Luddington, Edson L.**, biography, 1159.
- Lyons**, lock built, 959, 960; aqueduct (1849), 961; bridge, Geneva st., 970, 971.
- Lyons Falls**, dam built (1854), 1006; bridge, 1007.
- Madison brook reservoir**, improvement, 1003.
- Madison, James**, opposition to canal, 9; vetoes Calhoun's plan, 81; felicitations at canal completion, 129.
- Main and Hamburg canal**, municipal construction authorized (1838), 590, 761, 959; survey (1839), State assumes (1840), Buffalo conveys to State (1843), 590-1, 960; bridge, 965; improvement (1866), 965; appropriation for completing, 966; sale permitted (1894), 601, 973; abandoned to Buffalo, 602, 975.  
*See also* Buffalo slips.
- Maine canal**, history, 1370; statistics, 1465.
- Manchester Ship canal**, history, 1480.
- Manlius Canal Co.**, incorporated (1828), 761.
- Maps**, Hutchinson's "blue line" completed (1834), 980, 988, 992, 999; enlargement "blue line" (1874), 275, 967; bibliography, 1353.
- Marcy, William L.**, Chenango canal, favorable views (1833), 679-80;

- urges enlargement (1834), 134; reviews State finances, 137.
- Maryland canals**, histories, 1392; statistics, 1469.
- Massachusetts canals**, histories, 1370; statistics, 1465.
- Mather, John C.**, impeached as commissioner (1853), 211.
- McAlpine, Charles L.**, biography, 1159.
- McAlpine, William J.**, biography, 1160.
- Mechanicville**, bridges, 984, 985; William st., 983; Park ave., 986; Burke ave., Francis st., 986, 987.
- Mechanicville Bridge Co.**, incorporated, 1022.
- Medina**, bridge, Church st., 961; Prospect st., 969; Shelby st., 974, 975, 976, 977.
- Meuse river**, canalization, history, 1492.
- Meuse-Scheldt canal**, history, 1492.
- Mentz**, removal, obstructions, 970.
- Miami and Erie canal**, history, 1401; statistics, 1472.
- Michigan canals**, histories, 1415; statistics, 1473.
- Middle Division (Erie canal)**, created (1816), 76; construction begun, 86; first contracts, ceremonies, 88, 957; Salina side-cut, 91, 957; completion, first boat (1819), 92, 957; celebration (1820), 98, 957; Salina side-cut extended (1823), 113, 958; double locks throughout (1860), 251; Black River canal attached (1876), 550, 1008; Chemung canal, transfer to western division (1877), 637; Crooked Lake canal, transfer to western division (1877), 652, 1000; cross-sectional diagrams (1848-62), 1040.  
*See also* names of localities.
- Middleport**, bridge, Vernon st., 962.
- Middlesex canal**, history, 1371; statistics, 1465.
- "Military Canals,"** history, 1446, 1461; statistics, 1476.
- Mills, Frederick C.**, Genesee Valley canal, survey (1834), report (1835), 711, 1010; investigates relative costs, canals vs. railways (1835), 143; surveys Erie canal (1835), 146; Black River canal, inclined planes, adverse report (1836), 531; biography, 1160.
- Mills, John B.**, survey of Delaware and Hudson canal (1823), 732; survey of Susquehanna extension (1826), 739; surveys Caughnawaga route (1849), 191.
- Mills, Hiram P.**, biography, 1160.
- Minden**, sanitary improvement, old canal, 974; bridge, 976, 977, 978.
- Minnesota canal**, history, 1439; statistics, 1475.
- Mississippi canal**, history, 1439; statistics, 1475.
- Missouri canal**, history, 1437; statistics, 1475.
- Mohawk river**, Colles' survey, 19; Colles' proposed improvements, 23, 955; Cohoes dam completed, 416, 980; feeder completed (1826), 132, 958; difficulties of constructing Erie canal, 796; dam built below Cohoes falls, 980; enlarged aqueducts completed (1842), 960; lower aqueduct rebuilt (1859), 963; Cohoes, dam raised (1862), 431, 982; dam built, Rexford Flats, 964; Little Falls dam, 344, 347, 972; upper aqueduct, failure (1865), 964; stone dam at Cohoes authorized (1867), 433, 983; aqueducts, repairing, 346, 972, 973; Cohoes dam rebuilt (1894), 343, 351, 985; canalizing, Federal report, 364; disastrous floods (1904), 398, 978; bibliography, 1273.
- Monkland canal**, history, 1507.
- Monongahela river**, canalization, history, 1425; statistics, 1474.
- Montague canal**, statistics, 1465.
- Montezuma aqueduct**, historical, 800.
- Montezuma level**, Cayuga marshes, construction difficulties, 104; improvements, benefits expected (1860), 249.
- Montezuma marshes**, *see* Cayuga marshes.
- Montezuma side-cut**, authorized (1826), 958; bibliography, 1230.
- Montgomeryshire canals**, history, 1500.
- Montour Falls**, *see* Havana.
- Moore, Sir Henry**, Governor's message (1768), 21, 955.
- Moose river**, tolls authorized, 1007; dam at Old Forge, 545, 1008.
- Morgan, Edwin D.**, State and canal finances "inextricably entangled" (1859), 243; condemns unconstitutional expenditures (1859), 247; urges enlargement completion (1859), 243, 963; urges railroad tolls (1860), 251.
- Morrisburg canal**, *see* Rapide Plat canal.
- Morris canal**, history, 1374; statistics, 1467.
- Morris, Gouverneur**, proposals, Erie canal, 52, 956; commissioner (1810), 63, 956; inclined plane, 70.
- Morse, James O.**, biography, 1160.

- Moses kill**, lock and aqueduct built, 422, 981; aqueduct rebuilt, 429, 982.
- Moyer creek**, improvement (1891), 971.
- Mt. Morris**, bridges, 1012, 1013.  
*See also* Genesee river and Genesee Valley canal.
- Mt. Morris dam**, completed (1852), 1011; rebuilding, 723, 1013.
- Muncy canal**, statistics, 1469.
- Murray canal**, history, 1445, 1463; statistics, 1451, 1476.
- Muskingum river**, canalization, history, 1428; statistics, 1474.
- Navigable season**, Hudson river, N. Y. canals, Lake Erie (1824-1905), 1060.
- Navigation and commerce**, bibliography, 1318.
- Nearing, W. Scott**, biography, 1160.
- Neversink Navigation Co.**, incorporated (1816), 761.
- Neversink river**, bibliography, 1274.
- Newark**, bridge, Main st., 973; proposed lock changes (1896), 367.
- New Berne and Beaufort canal**, history, 1397; statistics, 1470.
- New Hampshire canals**, histories, 1370; statistics, 1465.
- New Haven and Northampton canal**, history, 1373; statistics, 1465.
- New Jersey canals**, histories, 1374; statistics, 1467.
- Newkirk, William H.**, biography, 1161.
- Newtown and Flushing Canal Co.**, incorporated (1898), 761.
- New York and Sharon Canal Co.**, incorporated (1823), 761; bibliography, 1347.
- New York harbor**, bibliography, 1262.
- New York state** (pre-canal period), early settlement, 15; interior routes described (1724), 16; (French) trade rivalry, 18; colonial trade routes, 20; English obstructive policy, 20; Gov. Moore's message (1768), 20, 955; Washington's tour (1783), 22; Colles' proposed Mohawk improvement, 23, 955; legislative improvement plan (1791), 29, 955; first canal law (1791), 29, 955.
- Niagara Canal Co.**, incorporation (1798), history, 45, 761, 956.
- Niagara Canal Co.**, incorporated (1823), 761, 958.
- Niagara canals**, bibliography, 1345.
- Niagara river**, survey, Erie to Ontario (1808), 59; Gallatin's report (1808), 63; Pope's bill (1810), 64; Porter's bill (1810), 64; lift-lock (1824), 958; Federal ship canal project (1840), 164; ship canal surveys (1853), 211; canal project (1865), 266; Federal surveys (1867), 267; Black Rock improvements, 300; Palfrey ship canal survey (1889), 333; Judson ship canal project (1892), other reports (1892-6), 336; Barge survey (1900), 384; proposed improvements, Barge canal estimates (1903), 395; bibliography, 1274.
- Niagara Ship Canal Co.**, chartered (1853), 212, 761; incorporated (1866), 761.
- Nine Mile creek**, feeder, 959; completed (1841), 960; made navigable, 263, 964.
- North-Branch lake**, reservoir built, 545-6, 1006, 1007; break, damage claims, 548, 1008; rebuilt, 1008.
- North Carolina canals**, histories, 1396; statistics, 1470.
- North, Edward P.**, consulting engineer, investigation commission (1898), 375.
- Northern Inland Lock Navigation Co.**, incorporation, promotion, 34, 761, 979; surveys and estimates (1792), 35, 979; lease of surplus waters, 979; right of way, 979; State aid, 36, 38, 970; work commenced (1793), 37, 979; examination, Hudson river, 1019; progress, results, 39; Watson's review, 39; Clinton's criticisms, 41.
- Northern Slack-water and Railway Co.**, incorporated (1846), 761.
- North Tonawanda**, bridge, Main st., 971.
- Northumberland**, bridge, 986.
- North, William**, commissioner (1810), 63, 956.
- Northway, William R.**, biography, 1161.
- Norton, John V.**, biography, 1161.
- Norwich**, bridges, 1003.
- Nova Scotia canals**, histories, 1449, 1463; statistics, 1451, 1476.
- Nunda**, bridge, State st., 1012; bridge, 1013.
- Oak Orchard** (Oneida river), dam, lock, bridge (Schroeppel's), 570, 573, 574, 1016, 1017.
- Oak Orchard creek**, feeder enlarged (1840), 960; improvement, creek and feeder (1863), 964; creek deepened, 965; improvement, creek and feeder (1893), 346, 972.
- Odell, Benjamin B. Jr.**, recommendations (1902), 391; reviews canal question (1903), 393.

- Ogeechee canal**, statistics, 1471.
- Ohio and Erie canal**, history, 1399; statistics, 1471.
- Ohio and Pennsylvania canal**, history, 1405; statistics, 1472.
- Ohio canals**, histories, 1339, 1427; statistics, 1471, 1474.
- Ohio river**, canalization, history, 1427; statistics, 1474.
- Oil creek reservoir**, completed (1858), 1012.
- Okeechobee canal**, history, 1399; statistics, 1471.
- Olmstead, Charles A.**, Glens Falls feeder, increased water-supply (1840-2), 423, 981.
- Oneida Lake canal**, Western Lock Navigation Co., Erie canal, effect on settlement, 654; early agitation, 654, 1000; Oneida Lake Canal Company, incorporated (1832), 656, 761, 1000; purchase by the State (1841), 659, 1000; reduction of tolls (1841), 659; stop law of 1842, canal made "constitutional" (1846), 660, 1000; Wood creek towing-path (1846), feeder bottomed out (1847), 660, 1000; Wood creek, new towing-path, deepening the lower levels (1849), 661, 1001; period of greatest traffic (1849), gradual diminution, 661; repair contracts, 1001; dilapidated locks, plans for enlargement (1860-1), 661, 1001; obstructions to traffic, sand bars, lock reconstruction, estimates (1862), 662, 1001; lock enlargement begun, traffic suspended (1863), 662, 1001; enlargement stopped, new route discussed (1863), 663, 1001; renewed efforts to reopen, or build new line (1866), 664; survey for new line ordered (1867), comparative estimates, 664-5; auditor's tonnage estimates, 665; controversy referred to canal board, new route adopted, construction begun (1867), 666, 1001; supplementary contracts, cost doubled (1869), 666, 1001; work suspended (1870), 667, 1001; second supplementary contracts, 667, 1001; further delay, insufficient appropriations (1871-2), 667, 1001; abandonment discussed (1875), work suspended to 1877, 668, 1001; resumption, new estimates, completion (1877), 669, 1001; disastrous breaks, canal closed (1877), 669, 1001; reopened (1878), final closing, abandonment advocated (1879), dismantled, lands released, officially abandoned (1887), 670, 1001; present condition, effect of Barge canal, 671; annual tonnage (1841-1861), 1062; annual tolls (1841-1863, 1877-78), 1066; cost and revenues, summary (1882), 1068; statistical tables, 1034, 1467; bibliography, 1246.
- Oneida Lake Canal Co.**, incorporated (1832), 656, 761, 1000; terms and conditions, commissioners to survey and locate route, 656; construction (1835), 657, 1000; Fish creek extension, 658, 1000; purchase by the State (1841), 659, 1000.
- Oneida River Improvement**, early use of river, first survey (1808), 569, 1016; Caughdenoy and Oak Orchard dams authorized (1824-8), 570, 1016; repealed (1829), 571, 1016; Child's survey, removal of obstructions (1829), 571, 1016; estimates (1830), 572, 1016; steamboat channel, survey ordered (1836), 572, 1016; survey (1838), report (1839), 572, 1016; work authorized (1839), 573, 1016; progress (1839-41), stop law of 1842, effect, 573, 1016, 1017; work resumed (1849), Oak Orchard drawbridge, difficulties (1850), 573-4, 1017; later improvements (1874), abandonment discussed (1883), other improvements (1889-90), 574, 1017; relation to Barge canal (1905), 575; annual tolls (1846-1882), 1066; cost and revenues, summary (1882), 1068; statistical tables, 1036, 1466; bibliography, 1246.
- Onondaga Canal Co.**, incorporated (1824), 761.
- Onondaga lake**, outlet lowered (1822), 447, 987; (1841), 988; shore protection, 452, 988; outlet bridge, 989.
- Onondaga river**, *see* Oswego river and Oswego canal.
- Ontario Canal Co.**, incorporated (1821), 761, 957.
- Ontario canals**, histories, 1443, 1448, 1454, 1463; statistics, 1450, 1476.
- Orange and Sussex Canal Co.**, incorporated (1824), 761; bibliography, 1346.
- Oregon canals**, histories, 1409, 1423, 1439; statistics, 1472, 1474, 1475.
- Oriskany creek**, feeder completed (1871), 967; repairs, 975; aqueduct, new trunk, 968.
- Orleans Bank canal**, statistics, 1471.
- Osage river**, canalization, history, 1437; statistics, 1475.
- Oswegatchie Navigation Co.**, incorporated (1831), 761.

- Oswegatchie Navigation Co.**, incorporated (1848), 761.
- Oswego**, pier built (1837), 988; bridge, near weigh-lock, 989; Utica st., 989; wall built, 990; elevator lift proposed (1895), 360.
- Oswego canal**, Ontario route, objections, 48; survey ordered (1808), 59, 956, 987; Geddes' report, difficulties, 444, 987; Platt's plan (1810), 62; Clinton's interest, 62; Gallatin's report (1808), 63; commissioners appointed (1810), 63; Pope's bill (1810), 64; Porter's bill (1810), 64; first step, Salina side-cut (1819), 446, 987; plans and estimates (1820), Salt Springs fund, 447, 987; Salina side-cut extension (1822-3), 447, 987; Hutchinson's survey and estimates (1824), 449, 987; construction authorized and begun (1825), 450, 987; progress (1826-7), Liverpool level, Erie connection, 451; bank protection, Onondaga lake, 452, 988; completion, construction details (1828), opening (1829), 452, 987, 988; enlargement, first step, Mud lock rebuilt (1836), 453, 987, 988; flood damages (1836, '37, '43, '46), 988; State assumes present Salina side-cut (1837), Liverpool side-cut (1845), 988; improvement at dams, 988; Seneca river towing-path, connection established (1839), 566, 1015; Liverpool, marsh overflow, epidemic (1842), 454, 988; Onondaga lake, outlet reopened (1842), "stop law," 455, 988; Constitution of 1846, improvements, restrictions, 457, 988; reduces Erie revenues (1847-50), 458; special loan, lock enlargements (1851), 209, 459, 988; "the big letting" (1851), 199, 988; work again stopped (1852), 202; line changed, Phoenix (1852), 988; compared with Champlain, relative importance (1853), 459; improvements of 1853-4, 460; constitutional amendment (1854) provides for enlargement, 988; revised estimates (1854), 214, 461; progress (1854-62), 461-2, 988, 989; present Salina side-cut, extension (1856), 989; Gascon-Mud lock, difficulties, improvements (1856-9), 461; capacity increased (1857), 236; removing "big bevels," enlargement completed (1860-62), Oswego weigh-lock, 462, 989; lock estimates, national defense (1862), 262; survey for "gunboat locks," estimates (1863), 262, 989; rebuilding dams, 464, 989, 990; freshets, damages (1865), 464, 466, 989; (1867), 989; improvements, Salina side-cuts, 465, 990; completing so-called enlargement, new estimates (1869), 276; completion of stone dams (1873), 466, 989; flood damages (1873), 990; lock-lengthening, 467, 990, 991; proposed Federal ship canal (1893), nine million improvement, 469; law regulating contracts (1896), 991; nine million improvement, dimensions, purposes, progress, 470, 991; (1896), 363; contracts suspended, settlement of claims, 471; Barge survey (1900), 384, 471, 991; act of 1903, progress of work, 471, 991; cross-sectional diagrams (1895), 1050; (1903), 1052; tables of existing structures, 1123; annual tonnage (1837-1905), 1062; annual tolls (1828-1882), 1064; cost and revenues, summary (1882), 1068; statistical tables, 1031, 1466; bibliography, 1238, 1360.
- Oswego Canal Co.**, organized (1823), 448, 762, 987; State assumes control, joint ownership, 452, 987.
- Oswego-Mohawk route**, Ontario-Hudson plan (1835), 143, 572; Himes' survey (1895), 359.  
*See also* names of localities.
- Oswego-Oneida-Mohawk route**, *see* United States Deep Waterways Commission.
- Oswego river**, portage at rapids, 17; proposed improvements (1786), 25, 955; plans and estimates (1820), Salt Springs fund, 447, 987; improvement, legislative action (1819), 446, 987; dams, sloping aprons built, 466, 990; steel and stone aprons built at dams, 469, 990.  
*See also* Oswego canal.
- Otisco lake**, reservoir, appropriation, 966; completed, 967.
- Owasco and Erie Canal Co.**, incorporated (1829), 762.
- Owasco lake**, raising dam, 967; completed, 967; improvement (1895), 973; new dam, 967.
- Ottawa canals**, history, 1446, 1460; statistics, 1450, 1476.
- Ouachita and Black rivers**, canalization, history, 1435; statistics, 1475.
- Page's brook**, aqueduct built, 1002.
- Palmyra**, bridge, Kent st., 969.
- Panama canal**, history, 1424; statistics, 1474.
- Parker, Ely S.**, bibliography, 1161.

- Pawtucket Falls canal**, history, 1370; statistics, 1465.
- Peacock, William**, western division (1816), 76.
- Peacond Navigation Co.**, incorporated (1835), 762.
- Peconic River Lock Navigation Co.**, incorporated (1808), 762.
- Pendleton**, bridge near, 976, 977.
- Pendleton, Nathaniel**, supports construction act, 83.
- Penns Neck canal**, statistics, 1468.
- Pennsylvania canals**, histories, 1377, 1425; statistics, 1468, 1474.
- Perkins, George R.**, biography, 1162.
- Pheips, Chauncey L.**, biography, 1162.
- Phoenix**, bridge, Bridge st., 988.
- Piermont**, pier removal, 1024.
- Pittsford**, bridge, Main st., 975, 977.
- Plaquemines canal**, statistics, 1471.
- Platt, Jonas**, plans new surveys (1810), 62; bill to buy Western Co., 70.
- Point Iroquois canal**, *see* Galops canal.
- Portage canal**, *see* Fox river.
- Portage Lake ship canal**, history, 1420; statistics, 1473.
- Portages**, Little Falls, Wood creek, Oswego rapids, 17, 443; Shinnecock and Peconic (Canoe Place), 578.
- Port Arthur ship canal**, history, 1410.
- Port Byron**, aqueduct, 959; State ditch opened, 965; feeder dam destroyed, 967.
- Porter, Peter B.**, commissioner (1810), 63, 956; efforts in Congress (1810), 64, 956; Buffalo-Black Rock contest (1822), 110.
- Port Jackson**, aqueduct completed (1841), 960; bridge, 966.
- Port Leyden**, bridges, North st., Main st., 1007.
- Poughkeepsie Bridge Co.**, incorporated, 1022; time extended, 1022, 1023.
- Powell, Archibald C.**, biography, 1162.
- Propulsion**, steam-power suggested (1867), 268; various methods tried (1868), 274; European, or Belgian system, Kingsley-Gardner cable system, 278, 283, 966, 967; steamboat "Barnard," 279, 966; power systems, commission to examine (1871), 282, 966; steamboat "Dawson," 967; Belgian system, steam experiments (1872), 285, 967; trial, road engine, 967; amendment (1873), 967; steam, further tests, awards, 288, 967; Baxter steamboat, cable towage (1874), 290; progress of experiments (1875), 299; further experiments authorized (1876), 302, 968; steam towage, various tests, Stevenson system, Baker single-rail system, 305, 968; "Baxter" boat, Belgian system, Frick system, 306, 968; Cooke system, Belgian system (1879), 310, 968; steam towage, Illinois system (1880), 312; experiment (1880), 312, 969; steamer with five consorts (1891), 971; electric generation, waste water plan (1893), 344; electrical experiments, trolley system (1893), 347, 972; Mulligan system, 355, 359; appropriation (1895), 973; Lamb system (1895), 358, 974; Dutton device (1895), 361; Wood system (1903), 397, 978; bibliography, 1339.
- Prussian canals**, projects (1482), 1490.
- Quebec canals**, histories, 1441, 1446, 1454; statistics, 1450, 1476.
- Queensbury**, bridge, 966.
- Rafter, George W.**, canal bridges, special report (1895), 361; western division, water-supply, special report (1896), 363; Genesee storage project, final report, 368; deep waterway survey (1897), 371.
- Railroads**, adverse attitude (1847), 182; divert passenger traffic (1849), 191; no tolls, livestock (1850), 191, 961; tolls abolished (1851), 195, 961; results of act of 1851, 196; re-imposition tolls defeated (1855), 221; tolls again urged (1858), 237; malign influence shown (1858), 239; tolls again defeated (1859), 246; tolls finally defeated (1860), 251; canal tolls, historical (1877), 308; cost of traffic compared with canals, betterments, 318; Cayuga and Seneca, Geneva, encroachments, 499; canal regulates rates, 322, 905; Forestport reservoir, embankment, legal controversy (1894-1904), 553, 1009, 1010; rates lowered, contemplated effect (1895), 360; use of canal bed for tracks proposed (1902), 391.
- Railroads vs. canals**, bibliography, 1314.
- Rainy river improvement**, history, 1463.
- Ramsay, Henry**, biography, 1162.
- Rapide Plat canal**, history, 1443, 1456; statistics, 1476.
- Regent's canal**, history, 1500.
- Reim**, boat scale, 278.
- Reports**, annual, N. Y. canal officials, bibliography, 1186.



- Reservoirs**, *see* Feeders, Water-supply and names of localities.
- Resident engineers**, tabular lists (1850-1905), 1142-3-4.  
*See also* State Engineer and Surveyor.
- Rexford Flats**, dam completed (1867), 905; repairs, 356, 974; bridges, 965, 978.
- Rhine river**, canalization, history, 1488.
- Rhine-Weser-Elbe canal**, history, 1491.
- Rhone river**, improvement, history, 1484.
- Richardson, John**, begins construction, 88.
- Richmond, Denison**, device, turbines at locks, 969; death, 970; biography, 1162.
- Richmond, Van R.**, Montezuma aqueduct, 227, 800, 962, 1018; opposes further expenditures (1862), 256; chairman, towage commission (1871), 282; biography, 1162.
- Rideau canal**, history, 1447, 1462; statistics, 1450, 1476.
- Right of way**, Northern Inland Lock Navigation Co., 979; Western Inland Lock Navigation Co., 955.
- Riquet, Francis**, designer Languedoc canal, 6.
- Riverhead Canal and Mill Co.**, incorporated (1854), 762.
- Rivers**, canalized, *see* United States canalized rivers and names of rivers.
- Roberts, De Witt C.**, biography, 1163.
- Roberts, Nathan S.**, surveys (1820), 102; designs Lockport locks, 797; Chenango canal survey (1827), 675; surveys, Erie canal (1835), 136; biography, 1163.
- Rochester**, aqueduct, foundations, 107; completed (1823), 112; new aqueduct completed (1842), 171, 960; Genesee feeder dam destroyed, 190; new dam completed, 264, 964; mill owners' claims (1854), 214; settled (1856), 223; bridges: Buffalo and Fitzhugh sts., 960; Alexander st., 960; Clay st., 1011, 1013; Allen st., 961, 968; acquirement, Smith's, abandonment, Howell st., 961; Exchange, Washington and Buffalo sts., 962; Nelson st., 962; Griffin st., 962; Atkinson st., 1012; Plymouth ave., 1012; Hunter st., 1013; Buffalo st., 966, 967; Monroe ave., 970, 975-6; W. Main st., 970, 973; Caledonia ave., 970, 971; Culver st., 971; Rome st., 971; Ford st., 972; Emerson st., 972, 973, 974; Griffith st., 350, 964, 973; Exchange st., 356, 965, 974, 975, 976; special, Main st., Rafter's report (1895), 361; Fitzhugh st., 974, 975, 976, 977; Clinton st., 975-976; West ave., 976, 978; Lyell ave., 978; Plymouth ave., 978; wall, St. Paul st., 973.
- Rochester Canal and Railroad Co.**, incorporated (1831), 762.
- Rochester, William B.**, supports construction act, 83.
- Rockville reservoir**, completed (1841), 1011.
- Rocky Rift feeder**, dam and feeder completed (1856), 962; appropriation (1896), 974.
- Rogers, Albert B.**, biography, 1168.
- Rome**, new location, independent line, 153, 172, 959; lock and waste-weir, 132, 959; Mohawk dam and feeder completed (1856), 962; draining old canal, 970, 971, 972; bridges: Washington st., 961, 965; Jay st., 961; Dextater and Bouck sts., 962, 1004; Floyd st., 1008; at Black River canal junction, 1008; S. George st., 971, 975, 976, 977; S. Madison st., 972; S. James st., 972; Thomas st., 1009; Garden st., 1009, 1010; walls, Lock st., 1009.
- Rondout**, ferry across Hudson, 1022.
- Roosevelt, Theodore**, canal investigation, appoints counsel, their report (1899), 379.
- Root, Portous R.**, engineer, Black River canal (1836), 530, 1005.
- Rough river**, canalization, history, 1432; statistics, 1475.
- Royal canal**, (Ireland), history, 1504.
- Ruggles, S. S.**, "gunboat" commissioner to Congress, 964.
- Sacolds canal**, statistics, 1471.
- Salina side-cut**, bibliography, 1230.  
*See also* Middle division and Oswego canal.
- Salmon River Harbor Canal Co.**, incorporated (1837), 762.
- Saluda canal**, statistics, 1471.
- Sand lake**, reservoir built, 551, 1008.
- Sandy and Beaver canal**, statistics, 1472.
- Sandy Hill**, bridge, 985; Main st., 986.
- Santa Fe canal**, statistics, 1471.
- Santee canal**, statistics, 1471.
- Santee River canal**, history, 1411; statistics, 1473.
- Saratoga dam**, completed (1821), 416, 979; raised (1844), 425, 981; re-

- built (1857), 429, 982; damaged (1869), 983.
- Saratoga falls**, guard-lock rebuilt, 420, 980; discharge-lock rebuilt, stone, 980; bridge destroyed, 425, 981.
- Sault Ste. Marie canal**, history, 1446, 1457; statistics, 1417, 1451, 1476.
- Schenck, Martin**, Barge canal, first official presentation (1892), 345; biography, 1163.
- Schenectady**, relocation, 107; bridges, Rotterdam st., 960; "Liberty st.", 970; Church st., 971; State st., 974; berme wall, 343, 350; bank improvement, 350, 973; canal wall, repairs, 973.
- Schoharie creek aqueduct**, completed (1841), 960; new trunk (1855), 962; damages for construction allowed (1861), 963; new trunk (1873), 967; repairs (1893-4), 972-3.
- Schoharie creek dam**, built (1822), of timber on piles, 958; rebuilt of brush and gravel (1828-32), 959; damaged by flood (1843), 960; stone dam completed (1862), destroyed, replaced by tree dam (1864), 964; rebuilt (1894), 973.
- Schuyler, Philip**, support gained, 31; procures passage Lock Navigation Law (1792), 33; predicts Erie canal, 51.
- Schuylerville**, aqueduct enlarged, 425; 981; completed, 982; rebuilt (1873), 984; bridges, Saratoga st., 983; Ferry st., 983.
- Schuylkill canal**, history, 1383; statistics, 1469.
- Scotch canals**, histories, 1506.
- Scottsville Canal Co.**, organized (1829), 712, 762.
- Searles, William H.**, biography, 1164.
- Secretaries of State**, tabular list (1817-1905), 1134.
- Seeley, Samuel J.**, lock-gate apparatus, 221, 962.
- Seine river**, canalization, history, 1483.
- Seneca and Susquehannah Lock Navigation Co.**, incorporation (1815), Chemung route, 472, 608, 762, 995.
- Seneca Falls**, towing-path bridge, 992; dam built (1841), 992; dam below rebuilt, 992; dam and guard-gate built (1857), 493, 993; bridge, 995; Ovid st., 993, 994.
- Seneca lake**, first boat to N. Y. (1823), 115; lowering outlet, 479, 992; water-level controversy, 478, 992; fluctuations, controlling works proposed, 482; cutting bar, regulating weir proposed (1840), 483, 992; water-level controversy revived, new surveys (1842), 385; controlling works removed; failure of plan (1845), 486, 992; pier built, Watkins (1845), 996; outlet piers built (1851), 993; bridge, outlet, 993; sea-wall built at foot (1870), 496, 994; stone breakwater authorized (1894-5), completion (1897), 502, 994, 995; regulating lake level, new State works, completed (1903), existing phase, 503; bibliography, 1265.
- Seneca Lock Navigation Co.**, incorporated (1813), 472, 762, 991; stock increased (1814), time extended, State aid, completion (1821), 473; purchased by State, 476.
- Seneca river**, Montezuma aqueduct, 227, 962, 1018; bibliography, 1274, 1363.
- Seneca River Towing-path**, authorized (1836), constructed (1839), 566, 1015; steamboat channel survey ordered (1836), 566, 1015; navigation extended to Jack's reef (1853), 567, 1015; placed under canal regulations (1854), 567, 1016; floating bridge at Oswego canal junction dispensed with, towing-path extended (1871), 568, 1016; Jack's reef extension abandoned (1888), 568, 1016; absorption in Barge canal plan, 568; annual tolls (1841-1882), 1066; cost and revenues, summary (1882), 1068; statistical tables, 1036, 1466; bibliography, 1243.
- Serrell, Edward W.**, ship canal surveys (1853), 212.
- Sewalls Falls canal**, statistics, 1465.
- Seward, William H.**, advocates curtailing official powers (1839), 157; urges completion (1840), 161; retardation policy (1841), 165.
- Seymour, Horatio**, reviews canal policy (1844), 173; canal views, policy (1853), 203; convenes special session, 209; urges amendment (1854), 213.
- Seymour, Horatio, Jr.**, the "Seymour plan," 309, 968; Shinnecock and Peconic survey (1879), 577-8; biography, 1164.
- Seymour, Norman**, biography, 1164.
- Seymour, Silas**, biography, 1165.
- Sharon canal**, *see* N. Y. and Sharon Canal Co.
- Sheffield and Tinsley canal**, history, 1502.

- Sheffield district canals**, histories, 1502.
- Shelby basin**, bridge, 961.
- Sherburne**, bridge, 1003; repairs, canal bank, 1004.
- Shinnecock and Peconic canal**, location, early history, 574; Hutchinson's survey (1826), 577-8, 1024; survey ordered (1879), report (1880), 577-8, 1025; construction (1884-91), 579, 1025; effect on oyster industry, 580, 1025; highway swing-bridge, stop-gates, expedients for preservation (1893), 581, 1025; railroad bridge, 582-5; automatic tide-gates, 583, 1025; channel through bar, failure (1896), 583, 1025; Great South bay, connection, 586, 1025; rebuilding the tide-gates (1901-2), present condition, 586-7, 1025; statistical table, 1467; bibliography, 1243, 1361.
- Ship canals**, Ontario-Hudson (1835), 143; Niagara Federal project (1840), 164; Hudson-Champlain-St. Lawrence route (1849), 191; proposed Champlain enlargement (1850), 427, 981; St. Mary's (1853), 208; Albany and New Baltimore (1853), 208; Niagara project chartered (1853), 212; Portage lake to Lake Superior, concurrent resolution (1866), 965; engineers discuss (1884), 323; Palfrey Niagara survey (1889), 333; Judson survey, report to Congress (1892); other reports (1892-6), 336; Dr. Cortell's review (1891), 341; Maj. Kingman's statement (1892), 342; impracticability, 345; Congress, proposed survey, lakes to ocean (1893), 469; project in Congress (1894), 349; Congress authorizes survey (1896), 363; Oswego-Oneida-Mohawk route (1896), 364; report of U. S. engineers, routes in New York, 370; bibliography, 1204.
- Shrewsbury canal**, history, 1500.
- Shropshire Union canals**, histories, 1499.
- Shubenacadie canal**, history, 1463.
- Skaneateles**, feeder enlarged, 959; reservoir proposed (1842), 960; completed (1844), 960; Syracuse water-supply, 335, 337, 971.
- Smalley, Edward D.**, biography, 1165.
- Smith, De Witt C.**, biography, 1165.
- Smith, Jeffrey**, first navigation bill (1786), 25, 51, 955.
- Sodus Canal Co.**, incorporated (1829), 762; bibliography, 1348.
- Soulanges canal**, history, 1442; statistics, 1476.
- Soule, Howard**, biography, 1165.
- South Branch lake**, reservoir built, 545-50, 1006, 1007.
- South Carolina canals**, histories, 1398, 1411, 1425; statistics, 1471, 1473, 1474.
- South Hadley canal**, statistics, 1465.
- Sparkill Creek Canal Co.**, incorporated (1871), 762.
- Sprague, Joseph W.**, biography, 1166.
- Special Deputy State Engineer and Surveyor**, office created, Barge canal act (1903), 396; tabular list (1905), 1140.
- Stainforth and Keadby canal**, history, 1502.
- State Engineer and Surveyor**, office created (1816), 186; duties defined (1847), 961; law concerning annual reports, 963; division and resident engineers, law concerning, 963; canal force reduced (1862), 258; division and resident engineers created (1865), 265, 964; resident engineer authorized, Chenango canal extension, 703, 1014; subordinates, power to appoint urged (1874), 291; power of appointment (1876), 302, 968; additional duties, 968; tabular list (1848-1905), 1132.
- St. Clair Flats canal**, history, 1421; statistics, 1473.
- Ste. Anne's lock**, history, 1446; statistics, 1476.
- Stillwater**, waste-weir rebuilt, 980; bridge over Hudson, 1024.
- St. Lawrence and Champlain Co.**, organization, 191.
- St. Lawrence and Lake Champlain canals**, bibliography, 1346.
- St. Lawrence canals**, history, 1441, 1455; statistics, 1450, 1476.
- St. Lawrence Lock Co.**, incorporated (1808), 762.
- St. Mary's Falls canal**, charter granted (1853), 208; history, 1415; statistics, 1417, 1473.
- Stop gates**, table, Erie canal, 1108.
- St. Ours lock**, history, 1448, 1460.
- St. Peter's canal**, history, 1449, 1463; statistics, 1451, 1476.
- Stream receivers**, tables, Erie canal, 1109; Champlain canal, 1121.
- Stuart, Charles B.**, first State Engineer (1848), 186, 961; ship canal surveys (1853), 212; "gunboat" survey (1863), 262, 267.
- Sturgeon Bay and Lake Michigan canal**, history, 1421; statistics, 1473.
- Suez canal**, history, 1479.

- Sullivan**, culvert, repairs, 974.
- Sullivan, John L.**, Delaware and Hudson canal, examination (1823), 732; report and estimates (1824), 733.
- Sunday opening, New York canals**, petitions against, 958; bibliography, 1352.
- Superintendent of Public Works**, office created (1876), 302, 968; assumes control (1878), 307; land appropriation, power, 968; powers of contracting board, 963; tabular list (1878-1905), 1132.
- Surrey canal**, history, 1502.
- Surveyors-General**, tabular list (1817-1847), 1134.
- Susquehannah and Chenango (Whitney cross-canal)**, authorized (1836), 762.
- Susquehanna and Tide-water canal**, history, 1392; statistics, 1439.
- Susquehanna river**, bibliography, 1267.
- Sweet, Charles A.**, biography, 1166.
- Sweet, Elnathan**, ship canal project (1884), 323; biography, 1166.
- Sweet, Sylvanus H.**, "History of N. Y. canals," 1; biography, 1167.
- Symons, Thomas W.**, ship canal survey (1896), 363; member, Greene committee (1899), 380; Senate, vote of thanks proposed (1902), 391.
- Syracuse**, proposed changes (1836), 151; double locks completed (1840), 960; bridges: McBride, Townsend, Chestnut (Crouse ave.) sts., 961; N. Salina st., 989, 990, 991; Willow st., 989, 991; at Oswego canal junction, 989; Grape st., 964, 965; Salina, Bridge sts., 990; Salina st., 968, 975; James st., 990; Warren st., 967, 978; Catharine, Almond sts., 970, 975, 977; West st., 970; Mulberry and Lock sts. (State st.), 972; Clinton st., 972, 973; Geddes st., 350, 973; W. Genesee st., 973, 974, 975; Willis ave., 978; water-supply from Skaneateles lake reservoir, 335, 337, 971.
- Tacitus**, *see* De Witt Clinton.
- Tagliaferro canal**, statistics, 1471.
- Taintor, William N.**, biography, 1167.
- Talcott, William H.**, biography, 1167.
- Taylor, William B.**, biography, 1168.
- Telegraph lines**, *see* Canal telegraphs.
- Tennessee canals**, statistics, 1473.
- Tennessee river**, canalization, history, 1433; statistics, 1475.
- Terminal charges**, investigating committee, report (1880), 313; bibliography, 1306.  
*See also* Canal policy.
- Texas canals**, histories, 1410, 1423; statistics, 1474.
- Thomas, David**, surveys (1820), 100; Buffalo-Black Rock surveys, 111; Cayuga and Seneca survey (1824), 475; Cayuga marshes, report (1825), 1017; Crooked Lake canal survey (1828), report (1829), 641, 999; biography, 1168.
- Thurman**, bridge over Hudson, 1022.
- Tibbitts, George**, financial plan (1817), 82.
- Tidal Waterway Co.**, incorporated (1894), 762.
- Tilden, Samuel J.**, his canal policy (1875), 292; special canal message, 295, 968; appoints investigating commission, 297; special message, recommendations, 301, 968; reform spirit, results, "ring" broken, 303.
- Tombigbee river**, canalization, history, 1434; statistics, 1475.
- Tompkins, Daniel D.**, urges construction (1815), 73; prison labor suggested, 76; opposition, council revision, 84.
- Tonawanda**, side-cut lock, 967; bridges: Seymour st., 961; Main st., 970; Delaware st., 971.
- Tonawanda creek**, feeder completed (1824), 958; enlarged (1840), 960; creek improvement (1838), 959; removal backwater, 966; lowering dam, 966; bibliography, 1275.
- Tonnage, N. Y. canals** (1837-1905), 1062.
- Tracy, Henry**, examines water-supply, Genesee watershed (1849), 100; Erie water-supply surveys (1850), 191, 215.
- Tracy, James G.**, biography, 1168.
- Travel, New York canals**, bibliography, 1351.
- Treasurers**, tabular list (1817-1905), 1134.
- Trent canal**, history, 1448, 1462; statistics, 1451, 1476.
- Troy and Breaker Island Bridge Co.**, incorporated, 1023.
- Troy and West Troy Bridge Co.**, incorporated, 1022.
- Troy dam**, survey, report (1808-9), 1019; extension (1817), 1020; law to finish dam and lock (1821), 979, 1020; completed (1823), 980, 1020; dam, damaged (1825), 958; (1835), 980; (1837), 959, 981, 1020; (1840), 960, 1020; lock rebuilt (1854), 1021;

- dam repairs (1868), 1021; rebuilt (1869-71), 983, 1022; fishways (1870), 1022; (1887), 1023; report (1892), 1023.
- Troy, Lansingburg and Cohoes Bridge Co.**, incorporated, 1022.
- Truesdell, Charles**, biography, 1168.
- Trumbull, Earl**, builds first iron canal bridge (1840), 164, 803.
- Tubbs, J. Nelson**, biography, 1168.
- Tug fork**, canalization, history, 1430.
- Ulster canal**, history, 1506.
- Union canal** (New Hampshire), statistics, 1465.
- Union canal** (Pennsylvania), history, 1391; statistics, 1469.
- Union canal** (Scotland), history, 1506.
- United States Board of Engineers on Deep Waterways**, appointed (1897), 370.
- United States canalized rivers**, histories, 1425; statistics, 1474.
- United States canals**, histories, 1410; statistics, 1473.
- See also* Canals of United States.
- United States Deep Waterways Commission**, appointment (1895), 357; report (1896), 364.
- Upper White river**, canalization, history, 1437; statistics, 1475.
- Utica**, proposed changes (1836), 150; completion, lengthening lock 46, 339, 972; bridges: Garden st., 1002, 1003; Whitesboro st., 961, 975, 977; at lock 46, 966; Hotel st., 967; Columbia, Fayette sts., 1004; John st., 970; Schuyler st., 970, 971, 975, 977; Genesee st., 356, 971, 972, 973, 974, 975; Broad st., 975, 976; Washington st., 975, 977; walls: Gilbert st.-Turner st., 350, 973, 974; Clay st.-Hubbell st., 973.
- Van Alstyne, Henry A.**, biography, 1169.
- Van Buren, John D., Jr.**, member, investigating commission (1875), 297; "Van Buren survey" (1876), 303, 376, 963; biography, 1169.
- Van Buren, Martin**, amendment, act of 1816, 75; supports construction act, 83.
- Van Rensselaer, J. Rutsen**, proposal of 1817, 81.
- Van Rensselaer, Stephen**, commissioner (1810), 63, 956; commissioner (1816), 74, 410; scientific survey (1822), 115.
- Vermont canals**, statistics, 1465.
- Verplancks Point**, bridge over Hudson (1868), 1021; (1875), 1022; (1904), 1024.
- Vinci, Leonardo da**, lock-invention, 5.
- Virginia canals**, history, 1395; statistics, 1470.
- Volney**, bridge, 989.
- Wabash and Erie canal**, history, 1405; statistics, 1472.
- Wabash river**, canalization, history, 1436; statistics, 1475.
- Walhonding branch canal**, history, 1399; statistics, 1472.
- Wallaboht Canal Co.**, incorporated (1828), 762.
- Wallabout Canal Co.**, authorized (1838), 702.
- Wall benches**, *see* Canal policy.
- Warrensburg**, bridge over Hudson, 1022.
- Warrior river**, canalization, history, 1434; statistics, 1475.
- Washington Branch canal**, statistics, 1470.
- Washington, George**, early interest, 7; father of American canals, 22; Potomac improvements, 22; views to de Chastellux (1783), 22; views on internal improvements, 26.
- Waste-weirs**, tables, Erie canal, 1110; Champlain canal, 1122; Oswego canal, 1129.
- Wateree canal**, history, 1398; statistics, 1471.
- Waterford**, side-cut, construction, difficulties (1822-3), 416; dam completed (1824), 980; lock completed (1842), 424, 981; lock above completed, 426, 981; bridges, 983, 985, 986; Broad st., 983, 985; Division st., 986; Fourth st., 986; Fulton st., 986.
- Waterford Electric Light Co.**, dam authorized, 1024.
- Waterhouse creek**, aqueduct rebuilt (1847), 988.
- Waterloo**, dam built (1841), 992; raised (1867), 496, 993; injured (1884), 500, 994; canal improvement, 503, 994.
- Waterqueechy canal**, statistics, 1465.
- Water-supply (Black River canal)**, Erie canal feeder, Black River canal, reasons for construction, 530; proposed Black river diversion, opposition, 532; value as feeder to Erie demonstrated (1841), 540; feeder opened (1848-9), Black river insufficient, reservoirs planned, 542-3, 1006; head-water reservoir surveys

(1851-6), 544-6, 1006, 1007; diversion from Black river, compensating reservoirs, 550-1, 1007, 1008; additional supply needed, Independence, Beaver and Black river reservoirs, 551, 1008; reservoirs built, Canachagala, Bisby, White, Twin lakes, Fulton chain (1880-1), 1008; continued complaints, Forestport dam and reservoir, supply, survey and estimates (1888), 331, 343, 552; Forestport reservoir completed (1894), 351, 973, 1009; Forestport feeder, malicious breaks, 385, 975, 976, 977, 1009, 1010; telephone, Forestport-North Lake, 974; Adirondack water-supply, excerpts from report (1898), 554-60; Forestport pond, concrete dam (1903), 396, 1010; (**Cayuga and Seneca**), Seneca lake, water-level controversy, 478, 992; Seneca lake fluctuations, 482; cutting bar, regulating weir proposed, 483, 993; deepening upper level (1841), 484; Seneca lake level, controversy, new surveys (1842), 385; controlling works changed (1845), 486, 992; Seneca lake level, contention reappears (1851), 491; Waterloo dam raised, 496, 993; Seneca river, bars, loss of traffic (1872), 497; Seneca Falls dam rebuilt, Waterloo dam, 500; present controlling works, 503-4, 995; (**Champlain**), early plans (1817), 412; Geddes' discovery, Glens Falls feeder, 414; Glens Falls and Baker's falls routes considered (1820), 417; Glens Falls feeder, enlargement (1840-2), 423, 981; leakage estimates, 424; efforts to prevent (1843-50), 425; lease at Ft. Edward, 983; scarcity (1880), additional reservoir advised, 984; (**Chemung**), Chemung river diversion, additional reservoir surveys, report and estimates (1856), 632; (**Chenango**), Forman's investigation, report (1827), 674; Roberts, Hutchinson, Wright and Bates surveys (1827-9), 676-7; Kingsley brook reservoir restoration recommended (1862), 688; begun (1864), 689, 1003; completed (1867), 690, 1003; canal abandoned (1877), changes for feeder purposes (1878), 695; (**Crooked Lake**), proposed dam and storage reservoir (1829), 642; mill controversy (1833-6), 646, 999; deepening Penn Yan level (1864-70), 650, 999, 1000; scarcity (1872), 650, 1000; (**Erie**), Rome level, Black

river project (1825), 507; Conesus, Honeoye, Canadice and Hemlock lakes (1849), 190, 1011; Cazenovia lake (1849), 190; grant at Montezuma, 963; seventeen reservoirs completed (1861), 963; De Ruyter reservoir in use (1863), 263, 964; Genesee dam, Fish creek (1864), 264; De Ruyter reservoir, scarcity (1867), 272; Fish creek feeder (1868), 275; authorized (1869), 276, 966; surplus water, special report (1870), 966; Oriskany creek diverted (1871), 283; traffic diverted to Niagara river (1872), 284; Otisco lake, 289, 967; history, Black Rock harbor, surplus water, 300; restriction, surplus, Rome level, 969; Madison co., 343; Skaneateles lake, Syracuse Water Department (1889), 335, 971; Syracuse water act (1890), 337, 971; Genesee river storage project, Bailey survey (1889), 337; Lake Erie, low water, Genesee river project (1891), 342; Rocky Rift feeder (1893), 346, 972; (1894) 350; Genesee storage project, engineer's report, petition (1894), 351; Genesee storage dam defeated (1895), 357; western division, Rafter's report (1896), 363; Genesee storage project, further investigations (1896), 365; final report, 368; Genesee storage project, use of concrete, Rafter's report (1898), 378; Erie-Lockport level, Irondequoit embankment, 794; table, feeders and reservoirs, middle division, 1103; (**Genesee Valley**), Conesus lake reservoir (1848), 717, 1011; feeders and reservoirs, 721; summit level, raising the reservoirs (1863-9), 722-3, 1012, 1013; Loon lake taken (1872), 723, 1013; portions retained for Erie feeders (1880), 726; (**Oneida Lake**), canal company chartered, feeder requirements (1832), 655; Erie canal feeder (1867), 666; (**Oswego**), Geddes' report (1800), 445; Onondaga creek utilized, State salt pumps, 455; hydraulic demands, weirs introduced, 456; (**General**), feeders and dams, cost, surplus water revenues (1874), 289; Adirondack storage reservoirs urged, 327; bibliography, 1324, 1329.

**Watervliet**, bridges: Ireland Corners road, Island Park, 965; 984; 19th st., 977; 23d st., 977; walls, 14th st., 978.

*See also* West Troy.

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